March 1953

VOL. 65, No. 1 PAGES 1–62

The Wilson Bulletin

Published by

The Wilson Ornithological Club

at

Lawrence, Kansas

THE WILSON ORNITHOLOGICAL CLUB

Founded December 3, 1888

Named after ALEXANDER WILSON, the first American ornithologist.

President—W. J. Breckenridge, University of Minnesota, Minneapolis.

First Vice-President—Burt L. Monroe, Ridge Road, Anchorage, Ky.

Second Vice-President—Harold F. Mayfield, 2557 Portsmouth Ave., Toledo 13, Ohio.

Treasurer—Leonard C. Brecher, 1900 Spring Drive, Louisville 5, Ky.

Secretary—Phillips B. Street, Exton, Pennsylvania.

Membership dues per calendar year are: Sustaining, $5.00; Active, $3.00. THE WILSON BULLETIN is sent to all members not in arrears for dues.

WILSON ORNITHOLOGICAL CLUB LIBRARY

The Wilson Ornithological Club Library, housed in the University of Michigan Museum of Zoology, was established in concurrence with the University of Michigan in 1930. Until 1947 the Library was maintained entirely by gifts and bequests of books, pamphlets, reprints, and ornithological magazines from members and friends of The Wilson Ornithological Club. Now two members have generously established a fund for the purchase of new books; members and friends are invited to maintain the fund by regular contributions, thus making available to all Club members the more important new books on ornithology and related subjects. The fund will be administered by the Library Committee, which will be glad for suggestions from members on the choice of new books to be added to the Library. George J. Wallace, Michigan State College, East Lansing, Michigan, is Chairman of the Committee. The Library currently receives 65 periodicals as gifts and in exchange for *The Wilson Bulletin*. With the usual exception of rare books, any item in the Library may be borrowed by members of the Club and will be sent prepaid (by the University of Michigan) to any address in the United States, its possessions, or Canada. Return postage is paid by the borrower. Inquiries and requests by borrowers, as well as gifts of books, pamphlets, reprints, and magazines, should be addressed to "The Wilson Ornithological Club Library, University of Michigan Museum of Zoology, Ann Arbor, Michigan." Contributions to the New Book Fund should be sent to the Treasurer, Leonard C. Brecher, 1900 Spring Dr., Louisville 5, Ky. (small sums in stamps are acceptable). A complete index of the Library's holdings was printed in the September 1952 issue of *The Wilson Bulletin*, and each September number lists the book titles in the accessions of the current year. A brief report on recent gifts to the Library is published in every issue of the *Bulletin*.

THE WILSON BULLETIN

The official organ of The Wilson Ornithological Club, published quarterly, in March, June, September, and December, at Lawrence, Kansas. In the United States the subscription price is $3.00 a year, effective in 1951. Single copies 75 cents. Outside of the United States the rate is $3.25. Single copies, 85 cents. Subscriptions, changes of address and claims for undelivered copies should be sent to the Treasurer. Most back issues of the *Bulletin* are available (at 50 cents each for 1950 and earlier years, 75 cents each for 1951 and subsequent years) and may be ordered from the Treasurer.

All articles and communications for publication, books and publications for review should be addressed to the Editor. Exchanges should be addressed to The Wilson Ornithological Club Library, Museum of Zoology, Ann Arbor, Michigan.

Entered as second class matter at Lawrence, Kansas. Additional entry at Ann Arbor, Mich.

THE WILSON BULLETIN

A QUARTERLY MAGAZINE OF ORNITHOLOGY

Published by The Wilson Ornithological Club

Vol. 65, No. 1 | MARCH 1953 | Pages 1-62

CONTENTS

THE PRESIDENT'S PAGE ..... *W. J. Breckenridge* 4

GRAY HAWK, Painting by *George Miksch Sutton* ..... facing page 5

GRAY HAWK ..... *George Miksch Sutton* 5

HABITS AND HABITAT DIFFERENCES IN TWO RACES OF TRAILL'S FLYCATCHER ..... *John W. Aldrich* 8

THE PTERYLOSIS OF *Coua caerulea* ..... *Andrew J. Berger* 12

NOTES ON THE HAWAIIAN DUCK ..... *Charles W. Schwartz and Elizabeth Reeder Schwartz* 18

BEHAVIOR OF A YOUNG GYRFALCON ..... *Tom J. Cade* 26

NESTING ECOLOGY OF THE PIED-BILLED GREBE IN NORTHWESTERN IOWA ..... *Fred A. Glover* 32

GENERAL NOTES

BEHAVIOR OF A FEMALE EASTERN KINGBIRD ..... *Louise de Kiriline Lawrence* 40

FEEDING OF MALLARDS PREVENTED BY CROWS ..... *Dennis Rainey* 41

SUBSPECIFIC STATUS OF THE COMMON LOON IN FLORIDA ..... *Pierce Brodkorb* 41

POSSIBLE COMMENSALISM BETWEEN MYRTLE WARBLER AND YELLOW-BELLIED SAPSUCKER ..... *Lawrence Kilham* 41

EVENING GROSBEAK NESTING IN MONTANA ..... *Clifford V. Davis* 42

BIRD NOTES FROM THE TEXAS COAST ..... *James O. Stevenson* 42

CHUCK-WILL'S-WIDOW IN CENTRAL OHIO ..... *William M. Gilbert* 43

WHITE-RUMPED SANDPIPER IN INDIANA ..... *Russell M. Mumford* 44

"CATALEPTIC" BEHAVIOR IN THE HUDSONIAN CHICKADEE ..... *Tom J. Cade* 45

SOME BIRD RECORDS OF IMPORTANCE FROM NEW YORK ..... *Kenneth C. Parkes* 46

NOTES ON WARBLERS IN COLORADO ..... *A. Lang Baily and Robert P. Fox* 47

AVOCETS IN ALABAMA ..... *David C. Hulse and Thomas Z. Atkeson* 48

EUROPEAN TREE SPARROW EXTENDING ITS RANGE IN UNITED STATES ..... *T. E. Musselman* 48

CHESTNUT-COLLARED LONGSPUR: AN ADDITION TO THE LOUISIANA LIST ..... *Horace H. Jeter* 48

UNUSUAL BEHAVIOR OF TUFTED TITMOUSE ..... *Charles R. Goslin* 49

PLEISTOCENE BIRDS FROM HAILE, FLORIDA ..... *Pierce Brodkorb* 49

BLACK SNAKE CAPTURES NESTLING BLUE-WINGED WARBLER ..... *G. E. Grube* 50

IRAZU JUNCO—A PRIMITIVE MEMBER OF THE GENUS ..... *Harrison B. Tordoff* 51

LITTLE BLUE HERONS IN NORTHWESTERN PENNSYLVANIA ..... *John F. Mehner* 51

WING-FLASHING IN THE GRACEFUL MOCKINGBIRD, *Mimus gilvus* ..... *Fr. Haverschmidt* 52

AERIAL FEEDING OF THE RUSTY BLACKBIRD ON MOSQUITOES ..... *Tom J. Cade* 52

ORNITHOLOGICAL LITERATURE 54

Joseph James Murray, *A Check-list of the Birds of Virginia*, reviewed by Robert M. Mengel; William Henry Burt and Richard Philip Grossenheider, *A Field Guide to the Mammals*, reviewed by Keith R. Kelson; Robert Porter Allen, *The Whooping Crane*, reviewed by Thane S. Robinson.

CONSERVATION SECTION: VOYAGEUR'S COUNTRY: THE STORY OF THE QUETICO-SUPERIOR COUNTRY ..... *Sigurd F. Olson* 56

THE SCIENTIFIC VALUE OF A GROUP COLLECTION OF LIVE ANIMALS (reprinted) ..... *Konrad Z. Lorenz* 59

THE PRESIDENT'S PAGE

The idea in the minds of the founders of the Wilson Ornithological Club was undoubtedly the exchanging of records and experiences about birds. Soon the group's increase gave rise to the publication *The Curlew*, the purpose of which was to keep members in touch with each other's studies and findings. This still is the major purpose of *The Wilson Bulletin*.

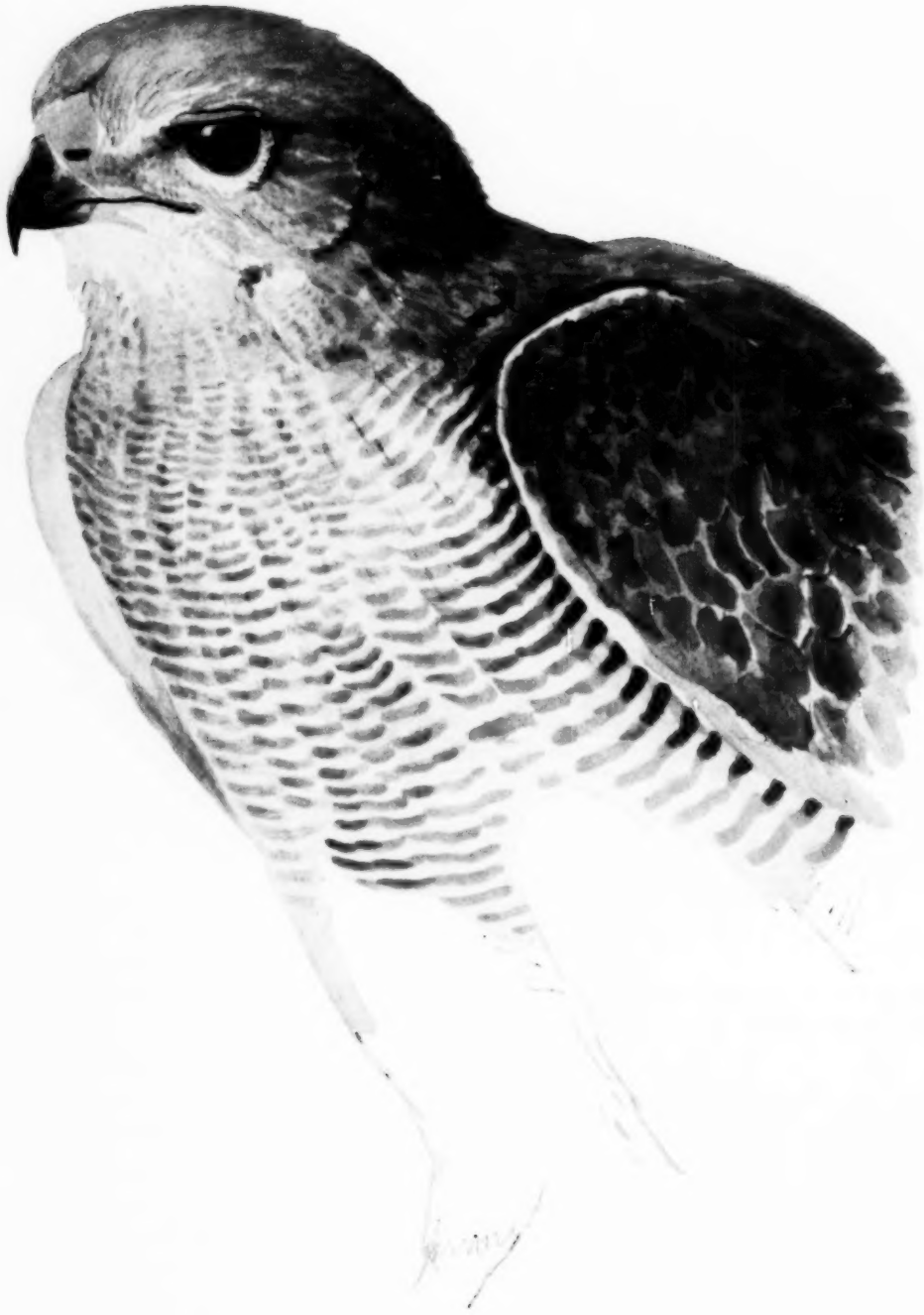
There is another commendable objective of a club such as ours, however, which I feel has not been realized to the extent it should be. There are many persons in the W.O.C. with financial means to spare, some of whom may be older, perhaps, and lacking physical fitness for strenuous field work, but who still are enthusiastic about furthering the study of ornithology. On the other hand, there are many capable young ornithologists with initiative and energy but with distinctly limited financial means. The W.O.C. is ideally situated to act in a liaison capacity for these two groups. In other words, why not make a definite effort to expand our program of research grants? This was exactly what was in the mind of one of our members when he anonymously contributed $500 back in 1947 for establishing the Louis Agassiz Fuertes Research Grant in honor of that outstanding bird artist. It was the donor's very laudable hope that this memorial grant might be perpetuated indefinitely through continued, but not necessarily anonymous, contributions from others. I feel that all too little publicity has been given to this project. Although there are comparatively few W.O.C. members today who knew Louis Fuertes personally, we are all very much aware of his remarkably life-like portrayals of our birdlife and a continuing memorial to Louis Agassiz Fuertes is certainly highly appropriate. At present only $25 remains in this fund; this is actually the amount of the only additional contribution that has been made to this fund to date, a contribution from one of our very active life members. Shall we award this small remaining amount to some promising candidate and allow this fine research grant to go out of existence? I say "No." Can't we find other generous contributors who will follow this member's lead and build up this fund again in order that further promising students may receive much-needed aid? Anyone interested in making such contributions, please contact me or our treasurer, Leonard Brecher.

All funds that W.O.C. members wish to contribute for such grants need not necessarily be placed in the Fuertes Fund. The Wilson Club will be happy to establish additional research grants either in the name of the donor or in honor of others. One such grant, the S. Morris Pell Fund, provides for $25 annual awards for three more years to be assigned to promising bird artists. This fund was established in 1948 by another anonymous donor in memory of S. Morris Pell, whose major interest was also in bird art. Applications for these awards should be sent to Dr. John Emlen, Department of Zoology, University of Wisconsin, Madison, Wisconsin.

Another grant, the Chalif Award, was an annual grant of $200 for research in Mexico, furnished by Mr. Edward Chalif, also a W.O.C. life member. Although this is not available this year, we understand that there is a possibility that next year it may again be awarded.

I hope that each year we can list an increasing number of research grants available for students in many ornithological fields. Won't you consider such contributions or talk to your friends who might be interested in extending such aid?

W. J. Breckenridge



GRAY HAWK

(Buteo nitidus)

Adult, sketched February 18, 1938, along the Rio Corona a few miles north of Victoria, Tamaulipas, by George Miksch Sutton. Fifth in a series of color-plates honoring the memory of Dr. David Clark Hilton.

GRAY HAWK

BY GEORGE MIKSCH SUTTON

THE northernmost of the five currently recognized races of the Gray Hawk (*Buteo nitidus*) has long been known as the Mexican Goshawk, a colorful name, but inappropriate since the bird is not accipitrine in shape, voice, or behavior. To more southward ranging races the name Shining Buzzard Hawk has been applied—again a not very satisfactory appellation. The species is about the size of the Red-shouldered Hawk (*B. lineatus*), and it is strikingly like that bird in that it is given to screaming loudly while circling above its nesting ground. It is especially noisy just before the season of egg-laying.

At a distance a perching adult Gray Hawk appears to be pearl gray all over. Actually, the upper parts of the body are gray; the under parts silvery white, finely barred with gray; the tail black, crossed with three white bands. The bill and claws are black; the cere, mouth-corners, tarsi and toes waxy yellow; the eyes dark brown. Seen from below, the wings of flying adults are white with black tips. Immature birds are pale buff below, boldly streaked on the throat, chest, belly, and sides (*barred* on the flags) with dark brown. Above they are dark brown with buff and rufescent markings. The tail (which is decidedly larger than that of the adult) is brownish gray, crossed with several black bars. Dickey and van Rossem (1938. *Zool. Ser. Field Mus. Nat. Hist.*, 28:115) inform us that "in those few individuals which breed the first year there is a partial body molt in which, in February and March, a few gray, adult feathers make their appearance." The Cornell University-Carleton College Expedition obtained two subadult males (with pearl gray feathers in the fuscous back plumage, and patches of gray-barred plumage on the chest and belly) on April 15 and 21, 1941, respectively, along the Río Sabinas in southwestern Tamaulipas (Sutton and Pettingill, 1942. *Auk*, 59:9). These individuals may or may not have been breeding.

Buteo nitidus is a bird of hot wooded lowlands. It breeds from the Lower Rio Grande Valley, southwestern New Mexico, and southern Arizona southward to "tropical eastern Bolivia" and "southern Brazil" (Peters, 1931. "Check-List of Birds of the World," 1:240–241). Its range is far from continuous throughout this vast area. In southern Arizona, where it appears to be commoner than elsewhere in the United States, it is virtually confined to the "grand mesquite forest" just south of Tucson (Brandt, 1951. "Arizona and its Bird Life," pp. 35, 75, 192–194). In parts of México visited by me I have found it principally along slow-moving streams, but it is decidedly local. Of its distribution in Central America, Griscom (1932. *Bull. Amer. Mus. Nat. Hist.*, 64:156) says: ". . . this hawk is found primarily in the Arid

Tropical Zone and is rare or absent elsewhere. It is . . . abundant on the Pacific slope of Guatemala, and occurs in the arid country in the interior, as at San Gerónimo and in the Rio Motagua Valley. It is most exceptional to find it above 3500 feet." Carriker (1910. *Ann. Carnegie Mus.*, 6:459) reports that it "does not occur on the Caribbean slope" of Costa Rica. Todd and Carriker (1922. *Ann. Carnegie Mus.*, 14:153), reporting on the birds of the Santa Marta region of Colombia, call it "a Tropical Zone bird, evidently regularly found only in the heavier forest of the lowlands."

In the United States, México, and at least some parts of Central America, it is migratory. For Sonora van Rossem (1945. *Mus. Zool. Louisiana State Univ.*, Occ. Pap. 21:57) reports "no northerly winter records." Arrival and departure dates for northern localities he gives for that State are March 29 (Nacozari) and October 26 (Oputo). According to Brandt (*op. cit.*, 193), the species returns to Arizona in April.

An adult Gray Hawk which I collected and sketched (see color plate) along the Río Corona, near Victoria, Tamaulipas, on February 18, 1938, apparently was not nesting (Sutton, 1951. "Mexican Birds," pp. 118-120). A male and female which I saw circling above the Río Sabinas later that spring (March 3) must, however, have been on their nesting grounds. The smaller bird "devoted itself to a beautiful courtship display. Swooping gracefully upward, it turned a backward flip, plunged deeply and again shot upward, letting momentum carry it to a position in front of the other bird before flipping backward or sideways again" (*ibid.*, p. 171). Swann, in his "Monograph of the Birds of Prey" (1930. 1:435–436), makes clear that there is a correlation between latitude and the season at which the species nests in North America: Arizona birds nest in May and June, southern Tamaulipas birds earlier (two eggs, Tampico, April 23), Guatemala birds still earlier (three eggs, April 3). Dickey and van Rossem (*op. cit.*, pp. 115) report that the nesting season in El Salvador is "in March or April, for young not able to fly were taken at Lake Chanmico at various dates in late May."

The nest is shallow, rather small, and not very strongly put together. Bent (1937. *U. S. Natl. Mus. Bull.* 167:265) tells of three Arizona nests (found May 19 and 20, 1922) respectively in a large mesquite, 40 feet up; a "giant hackberry," 60 feet up; and a large mesquite, 30 feet up. In each of these the lining was partly of green leaves. Swann (*loc. cit.*) describes a nest "composed of cottonwood twigs, broken off while green, with a lining of the leaves and bark-strips or willow tops." The eggs, usually two, sometimes three, are bluish white, occasionally flecked with pale brown, and usually more or less nest-stained. Neither the incubation period nor the fledging period has been ascertained, so far as I know. I have never seen a newly hatched young bird.

The Gray Hawk feeds on reptiles (especially lizards), insects, small mammals, and small birds. Otho C. Poling (in Bent, *op. cit.*, 266) observed a female "making daily trips to the mesquite plains for cottontails . . ." which she fed to her brood. On January 18, 1949, near Gómez Farías, Tamaulipas, I saw a Gray Hawk snatch at a branch and make off with a screaming small bird. Dickey and van Rossem (*op. cit.*, 116) tell of a Gray Hawk "shot as it was trying to carry off a white hen from the dooryard of the ranch house" at Volcán de San Miguel, El Salvador.

In northeastern México flocks of Brown Jays (*Psilorhinus morio*) frequently mob the Gray Hawk, screaming loudly but keeping at safe distance or hiding themselves in the foliage; they are especially bold if the hawk happens to be a "brancher" not long out of the nest.

Department of Zoology, University of Oklahoma, Norman, Oklahoma, March 1, 1953

HABITS AND HABITAT DIFFERENCES IN TWO RACES OF TRAILL'S FLYCATCHER

BY JOHN W. ALDRICH

I FIRST became interested in ecological segregation in races of Traill's Flycatcher (*Empidonax traillii*) in 1931, when Roger T. Peterson called my attention to the difference between the songs of Traill's Flycatchers breeding on the Appalachian Plateau near Jamestown, New York, and those of the Lake Erie plain only a few miles to the north. The birds of the plateau sang slurred, three-noted songs, with the accent on the second syllable, and the third syllable slurred to the extent that it was not distinctly separated from the second. This has been interpreted by Peterson as '*way-be-o*.' The birds of the lake plain uttered a distinctly two-syllabled, explosive '*fitz-bew*' with a sneezy quality and with the accent on the first syllable. Peterson suggested at the time that two races of Traill's Flycatcher might actually be represented and urged me to investigate it. This I have only recently had occasion to do.

In addition to the song differences noted above, Bent (1942:204) comments on differences in nests and nesting sites between Traill's Flycatchers breeding in the Mississippi Valley and adjacent states, and those breeding east of the Appalachian Mountains and farther north. He remarks that nests of the former are much like those from west of the Rocky Mountains. There are descriptions by a number of observers quoted by Bent, which indicate that there is a tendency for nests of Traill's Flycatchers of the prairie regions to be located in dry, brushy habitats, as well as brushy swamps, and to be much more compact in construction, similar to those of the Yellow Warbler (*Dendroica petechia*), as compared with the more loosely constructed nests similar to those of the Song Sparrow (*Melospiza melodia*). The latter type of nest is characteristic of Traill's Flycatchers of the northeastern and Appalachian Mountain regions. Arthur A. Allen has written me that he has found both the compact, Yellow Warbler type and the more bulky Song Sparrow type of nests in the Ithaca, New York area. He asserts that the compact nest is constructed by the lowland breeding birds with two-syllabled songs, while the loosely constructed nest is made by highland-breeding flycatchers with three-noted songs. He further comments that he has never heard the two-noted, lowland type of song in the Adirondacks or eastern Canada where the three-syllabled note is much in evidence. Aretas A. Saunders, who has made extensive records of bird songs, informs me (*in litt.*) that the three-noted song is the only one of the well-known songs he has heard given by Traill's Flycatchers in the Adirondacks, Vermont, Connecticut, and northwestern New Jersey. However, in summer after breeding is established these birds

call "que dee, two syllables, with the second higher pitched than the first." Birds at Sandy Lake, Minnesota, gave this '*que dee*' song also. At Chillicothe, Missouri, and Watertown, South Dakota, Saunders heard Traill's Flycatchers giving the '*fitz-bew*' song. At Fertile, Minnesota, he recorded a song that was halfway between the '*fitz-bew*' and '*way-be-o*' songs. McCabe (1951:91) described as '*creet*' a note which precedes the '*fitz-bew*' of southern Wisconsin Traill's Flycatchers when at the peak of singing.

McCabe (1951:90) organized various interpretations of Traill's Flycatcher songs from the literature according to whether they were three- or two-syllabled. He noted that they did not appear to fall into geographically segregated groups but pointed out that this could have been the result of difference in interpretation of sounds by different observers. It would seem quite likely that some of McCabe's interpretations of published descriptions of the songs might be interpreted differently. It may be that distinction between the quality of the sound, as well as placement of the accent, is more useful than an attempt to break it down into syllables for purposes of correlating songs with distinct breeding populations. It is well known to field ornithologists that it is difficult to express in words the differences in bird call notes which are quite obvious to the practiced ear. It is the opinion of several ornithologists including Aretas Saunders, Arthur Allen, Roger Peterson, Robert Stewart, and Chandler Robbins, with whom I have discussed this problem that there is, in fact, a difference between songs of the breeding Traill's Flycatchers of the midwestern region in general and those of the Appalachian highlands and the New England states.

The above observations are indicative of two distinctly different populations of the Traill's Flycatcher, distinguishable on the basis of song, nest-building habits, and geographic distribution. One of these breeds primarily in the bog-shrub habitats of the more boreal coniferous forest region of northern and eastern North America, and the other primarily in the brushy habitats of the interior prairies and plains. A study of large series of breeding specimens from eastern North America has shown that two morphologically distinct races are represented by these two segments of the population of Traill's Flycatcher, *Empidonax traillii traillii* and *E. t. campestris* (Aldrich, 1951:195), which have been shown to differ so noticeably in their habits.

It is possible that the western prairie population of Traill's Flycatcher was formerly more completely isolated from the eastern boreal population, but has recently come into closer contact by infiltration from the west, along the plain of the Great Lakes, since removal of the original forest cover has produced more satisfactory habitat for it. The relatively slight physiographic and ecological barrier which exists today between the Interior Lowlands and Appalachian Plateau physiographic provinces in western New York State ap-

parently has been sufficient to prevent complete genetic intermingling of these two populations as indicated by both specimens and field observation of song differences. It even seems that both races breed close together in one Lake Plain situation in northwestern Ohio, segregated merely by habitat differences. This was noted by Campbell (1936:164) who described differences in songs and nests of birds which nested in dry scrubby situations as compared with the more usual breeding habitat in wet brushy stream borders. Richard B. Fischer (1950) has given some evidence that the '*fitz-bew*'-singing race of Traill's Flycatcher may have even penetrated to the Atlantic coast and is establishing itself in areas south of the former range of the species at the lower elevations, although no specimens have been available for confirmation. In any case we know from specimens and field observation that both the pale interior prairie type with the '*fitz-bew*' song and the dark northeastern and highland type with the '*way-be-o*' song breed in close proximity today in western New York State, and the correlation of their distribution with the sinuous boundary between plain and plateau results in extremely interdigitated ranges. A parallel situation in mammals would seem to be that of the white-footed mouse, *Peromyscus maniculatus*, in which the range of the prairie race *bairdii* interdigitates with the range of the eastern boreal forest race *gracilis* in Michigan (Burt, 1946:206), and the race *osgoodi* with *artemisae* in Montana (Murie, 1933:4), as a result of occurrence of grasslands interspersed with forest areas. This situation of highly interdigitated ranges of two subspecies correlated with ecological differences has been noted in other species of birds, such as the Song Sparrows in the San Francisco Bay area (Marshall, 1948:209). Knowledge of these facts further suggests the probability that the ranges of *Empidonax traillii adastus* Oberholser and other western races of this species may have an ecological segregation, accounting for the confusion that has existed in the separation of races in the West. Further investigation in regions where two subspecies appear to overlap are needed to throw more light on this interesting problem.

Literature Cited

Aldrich, J. W.
1951 A review of the races of the Traill's Flycatcher. *Wilson Bull.*, 63:192–197.
Bent, A. C.
1942 Life history of North American flycatchers, larks, swallows, and their allies. *U. S. Natl. Mus. Bull.*, 179.
Burt, W. H.
1946 The mammals of Michigan. Univ. Michigan Press, Ann Arbor.
Campbell, L. W.
1936 An unusual colony of Alder Flycatchers. *Wilson Bull.*, 48:164–168.

FISCHER, R. B.
1950 Notes on the Alder Flycatcher. *Linnaean News Letter*, 4(3):3.
MCCABE, R. A.
1951 The song and song-flight of the Alder Flycatcher. *Wilson Bull.*, 63:89–98.
MARSHALL, J. T., JR.
1948 Ecologic races of Song Sparrows in the San Francisco Bay Region, Part 1. Habitat and abundance. *Condor*, 50:193–215.
MURIE, A.
1933 The ecological relationships of two subspecies of Peromyscus in the Glacier Park Region, Montana. *Univ. Mich. Mus. Zool. Occasional Papers*. 270:1–17.

U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C., APRIL 17, 1952

THE PTERYLOSIS OF *COUA CAERULEA*

BY ANDREW J. BERGER[1]

THE monotypic cuculiform genus *Coua* is restricted in range to the island of Madagascar. The genus and its ten species form the subfamily Couinae (Peters, 1940:64–66). Little has been written about the anatomy of the genus *Coua*. Milne-Edwards and Grandidier (1879) illustrated the skeleton of several species and presented measurements of certain bones. Beddard (1885:174 and 187) described the syrinx of *Coua ruficeps* from one of Garrod's manuscripts, and stated that the myological formula was ABXYAm. Pycraft (1903) illustrated the skull, sternum, and shoulder girdle of *C. reynaudi*. Grassé (1950:529) presented a photograph of palatal structures of a young *C. cristata*. So far as I can tell, this genus has been placed in a separate subfamily primarily because of its restricted range.

The pattern exhibited by the major feather tracts has long been used as an aid in taxonomy. The pterylosis of several genera of cuckoos has been described, and Beddard (1885:187) used the condition of the ventral feather tract as one of three characters in subdividing the family Cuculidae, although he stated (1898:275) that the pterylosis of *Coua* was unknown. On the basis of leg muscle formula and structure of the syrinx, he assumed tentatively (1898: 281) that the ventral feather tract of *Coua* was bifurcate and occupied the "whole of [the] space between [the] jaws." As can be seen from figure 1 and the description below, the latter part of his assumption was incorrect.

The two figures illustrating this paper make unnecessary a detailed description of the feather tracts. It does seem pertinent, however, to mention certain points not readily perceived by reference to the drawings, and certain features which I believe eventually may be of assistance in determining relationships within the family Cuculidae. Terminology used here follows that of Burt (1929).

Ventral tract. The inter-ramal region has a row three feathers wide on each side of the midline. There is a marginal apterion on the lateral sides of this tract; thus, the ventral tract does not occupy the entire inter-ramal space (see Lowe, 1943, text-figure 7, for an example of a completely feathered inter-ramal space). The ventral cervical tract is complete in the throat region, but bifurcates about 40 mm. caudal to the posterior margin of the gonys. At the junction of neck and thorax the cervical tract broadens out to cover nearly the entire anterolateral aspect of the thorax. As a result, a solid tract covers the lateral sternal and the axillary regions. Anteriorly, a single row of feathers passes laterad

[1] This study would not have been possible had it not been for the generosity of Dr. Jacques Berlioz, Muséum National d'Histoire Naturelle, Paris, who sent me an alcoholic specimen. I also am happy to acknowledge my indebtedness to my friend Mr. David F. Parmelee who made the feather-by-feather drawings. These were made with the greatest attention to detail and accuracy.

to become continuous with the ventral marginal coverts. Two abdominal branches, separated by a lateral abdominal apterion, arise from the posterior margin of the sternal-axillary region. The inner abdominal branch, consisting of a double row of feathers, forms two successive gentle curves as it passes caudad to terminate at the anterolateral margin of the anal circlet. The outer abdominal branch, consisting of a double row of feathers anteriorly, but of a single row posteriorly, extends caudad parallel to the inner abdominal branch, which it curves inward to meet about 20 mm. anterior to the anus. There is a complete anal circlet of feathers.

Capital tract. There is a small, triangular, median frontal apterion, and a much wider lateral apterion extending through the superciliary and occipital regions. Between the two lateral apteria there is a solid tract, covering the frontal, coronal, and occipital regions. This tract is continuous with the wedge-shaped *spinal cervical tract.* The latter is broadest at the base of the skull, and tapers to a width of two feathers a short distance posterior to the shoulder joint. The posterior half of the cervical tract is raised above the level of the surrounding skin, so that the break between the cervical tract and the feathers of the scapular region is even more pronounced than it was possible to indicate in figure 2. The scapular region is covered by four widely separated rows of four feathers each, and is connected with the cervical spinal tract by a single feather. Posteriorly, the scapular region is continuous with the more compact *dorsal spinal tract,* in which the rows contain six (anteriorly) or five (posteriorly) feathers. The two dorsal tracts converge at the midline to form a *median pelvic tract* which terminates anterior to the oil gland. A peculiar feature is the presence of a single row of feathers down the midline in the median dorsal apterion.

Humeral tract. The well developed outer, or major, humeral tract contains three (anteriorly) and four (posteriorly) rows of closely spaced feathers. This tract, also, is raised above the level of the surrounding skin. There is an inner, curved, humeral tract (not raised above the surrounding skin) consisting of a single row of feathers. Two pairs of widely separated feathers are located between the two humeral tracts.

Alar tract. There are ten primaries, ten greater primary coverts, and four or five middle primary coverts. There are five alula quills. A carpal covert and remex are present.

Like other cuckoos thus far studied, *Coua caerulea* is quintocubital. There are ten secondaries, 11 greater secondary coverts, 11 middle secondary coverts, and 11 lesser secondary coverts, although two shorter rows are interposed between the latter and the dorsal marginal coverts. The three rows of coverts are continuous with the tertials at the elbow.

Caudal tract. There are ten rectrices, but there are only eight upper tail-coverts. The oil gland is nude. It is, however, covered superficially by three feathers. One of these arises in the midline anterior to the gland, while the other two arise anterolaterally, and their shafts pass posteromesiad to cross near the posterior tip of the gland.

Femoral tract. This is an extensive, uniform tract covering the entire lateral and the upper half of the posterior aspects of the thigh.

Crural tract. This tract is strongest on the anterior and posterior aspects of the crus. Laterally the feathers form a symmetrical pattern, but they are more widely spaced. The central portion of the medial aspect of the thigh and crus is devoid of feathers.

A lateral view of the specimen reveals a wide lateral cervical apterion, widest at the junction of neck and thorax, and narrowest inferior to the ear opening. There is an extensive, pigmented bare area in the superciliary, sub-ocular, and occipital regions. Well developed "eye-lashes" are present on both lids—those on the upper lid being about 5 mm. in length; those of the lower lid are shorter. The lateral abdominal region is al-

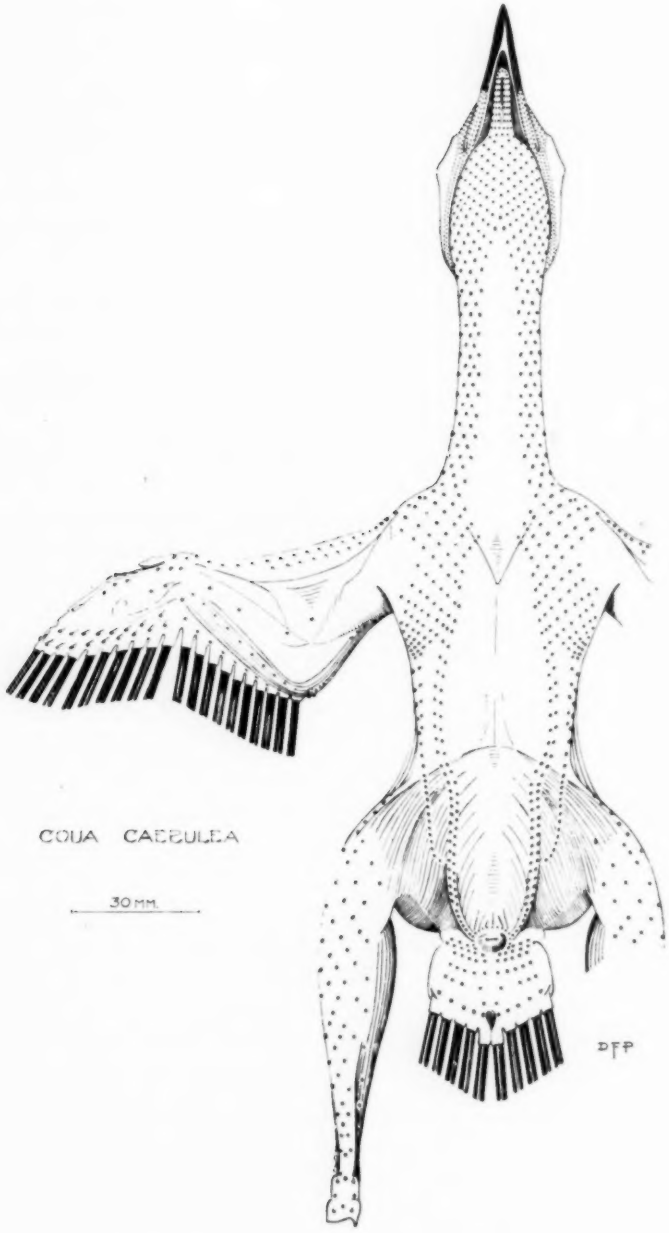


FIG. 1. Ventral view of *Coua caerulea* showing feather tracts.

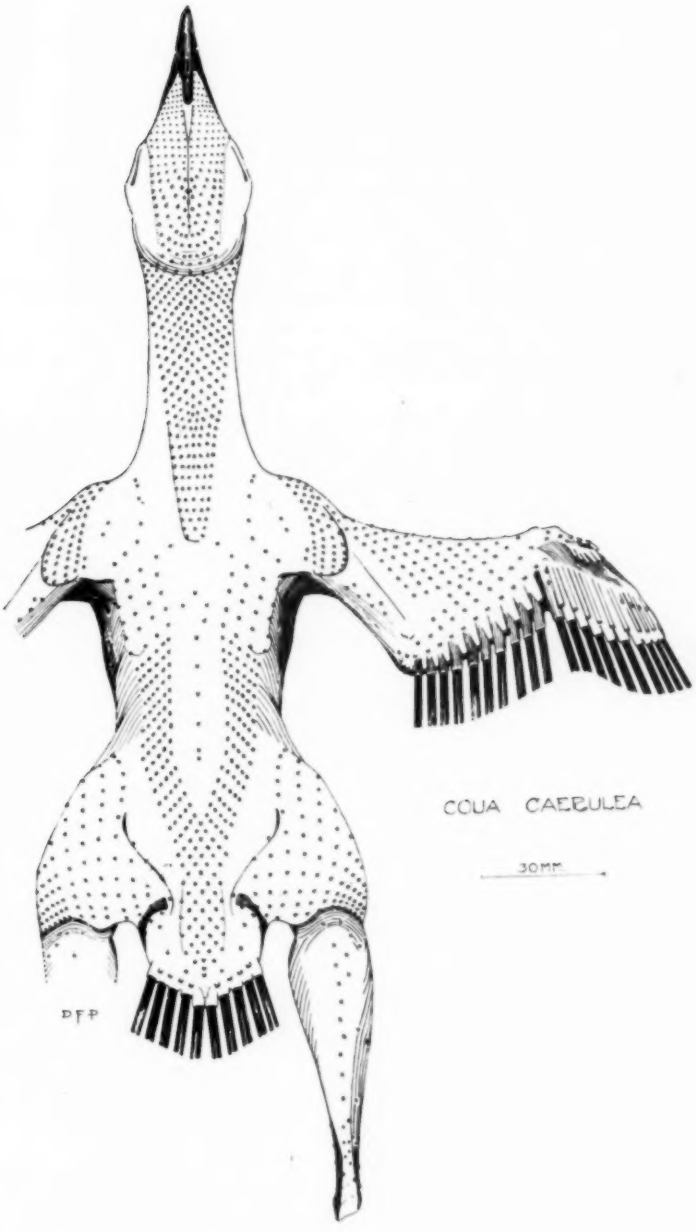


FIG. 2. Dorsal view of *Coua caerulea* showing feather tracts.

most devoid of feathers. There is, however, a loop formed by a single row of feathers, which is continuous below with the anterior tract of the thigh. Posterosuperiorly, the loop joins the upper margin of the femoral tract.

Notes on the molt. The specimen I had for study (No. 5529, Rand and Archbold collection) was collected May 10, 1930, 40 km. northwest of Maroantsetra, and exhibits an extensive molt. On the left wing, the fifth and seventh (innermost counted as first) primaries are nearly full length, but are sheathed at the base, while the fourth is only about 30 mm. in total length. On the right wing, the seventh primary is the only one still sheathed at the base. Of the secondaries (outermost considered as the first), the first of the left wing is nearly full length, but retains a sheath at its base; in the right wing, the first, third, and seventh secondaries still possess basal sheaths. The rectrices are nearly equal in diameter, but on the right side, the first (innermost) and the fourth possess basal sheaths, and on the left side, the second and fourth possess such sheaths. An extensive molt is evidenced throughout the dorsal regions, involving the capital, occipital, humeral, femoral, anterior crural, and the spinal tracts. There is likewise an extensive molt of the ventral tracts, extending from the inter-ramal region to the under tail-coverts.

Too little is yet known about the anatomy of *Coua* to permit any statement regarding its close affinities. It is interesting to note, however, that if we were to rely on the three anatomical features used by Beddard (1885:187; 1898:281), the presence of the marginal apteria bordering the inter-ramal tract would place this genus in close relationship with *Geococcyx*, *Crotophaga*, and *Guira*, three New World genera. The uncertain reliability of this single morphological character encourages caution in the selection and utilization of anatomical characters to determine relationships on the subfamily level.

Literature Cited

Beddard, F. E.
1885 On the structural characters and classification of the cuckoos. *Proc. Zool. Soc. London*, 1885, pp. 168–187.
1898 The structure and classification of birds. Longmans, Green and Co., London.

Burt, W. H.
1929 Pterylography of certain North American woodpeckers. *Univ. Calif. Publ. Zool.*, 30: 427–442.

Grasse, P.-P.
1950 Traité de Zoologie, Anatomie, Systématique, Biologie. Vol. XV. Oiseaux. Masson et Cie., Paris.

Lowe, P. R.
1943 Some notes on the anatomical differences obtaining between the Cuculidae and the Musophagidae, with special reference to the specialization of the oesophagus in *Cuculus canorus* Linnaeus. *Ibis*, 1943, pp. 490–515.

Milne-Edwards, A., and A. Grandidier
1879 Histoire physique, naturelle et politique de Madagascar. Vols. 12 and 13. Histoire naturelle des oiseaux. Alfred Grandidier, Paris.

Peters, J. L.
1940 Check-list of birds of the world. Vol. 4. Harvard Univ. Press, Cambridge.

PYCRAFT, W. P.
1903 Contributions to the osteology of birds. Part VI. *Cuculiformes. Proc. Zool. Soc. London.* 1903, pp. 258–291.

DEPARTMENT OF ANATOMY, UNIVERSITY OF MICHIGAN MEDICAL SCHOOL, ANN ARBOR, MARCH 11, 1952

NEW LIFE MEMBER

Born in Cincinnati, Ohio, on October 20, 1882, Mr. Christian J. Goetz became an extremely active bird bander in the late 1920's after acquiring a deep interest and knowledge of wildlife through various conservation projects and years of hunting and fishing. He retired from banding work in 1952 after ringing 31,181 birds in four states. Ducks were his favorites and of these he banded more than five thousand, mostly on the property of the Duck Island Hunting Club at Banner, Illinois. Mr. Goetz was a member of this club for many years. His plans for the future include many years of bird-watching and small-mouth bass fishing along the streams of southern Ohio. This photo was made as Mr. Goetz banded a hen Mallard at the Duck Island Club in December, 1938.

NOTES ON THE HAWAIIAN DUCK

BY CHARLES W. SCHWARTZ AND ELIZABETH REEDER SCHWARTZ

THE avifauna of the Hawaiian Archipelago contains three endemic members of the Anatidae. Of these, the Laysan Teal (*Anas platyrhynchos laysanensis*) and the Nene or Hawaiian Goose (*Branta sandwicensis*) are near extinction—only 30 teal existed in 1950 (Scott, 1951) and an estimated 33 wild and 24 captive Nene lived in 1952 (Smith, 1952); the Koloa or Hawaiian Duck (*Anas platyrhynchos wyvilliana*) is present in larger but still scarcely-safe numbers. Other species of waterfowl visit the Hawaiian Islands from North America but their sojourns are usually sporadic and brief. Although the Koloa occasionally joins flocks of migrant ducks during their island residence, it is not migratory.

Formerly, the Koloa occurred on all the major Hawaiian Islands and was common everywhere except on Lanai and Kahoolawe as reported by Perkins (1903), Munro (1944), and long-time residents interviewed during our game-bird survey (Schwartz and Schwartz, 1949). However, in recent years the population has been greatly reduced by draining of the principal breeding and feeding areas and by indiscriminate shooting. It is also likely that predation by mongooses, rats, feral cats, feral pigs, dogs, and humans, particularly on eggs and ducklings, has been instrumental in this decline.

The only numerical estimate of this bird's former abundance was given to us by Mr. Woodhouse of Kekaha Sugar Company. He reported about 400 ducks per square mile for the Mana Marsh area of Kauai prior to its drainage in 1923 and subsequent development into irrigated sugar-cane land. If this figure is reasonably correct, approximately 2,400 ducks may have resided in this tract of marsh which covered nearly six square miles and doubtless represented one of the best habitats of the Koloa. Our estimate was only five Koloa per square mile or a total of 30 for this same area in 1946–1947.

We found the Hawaiian Duck only on the islands of Kauai, Oahu, and Hawaii but it also is known to occur occasionally on Niihau (L. Robinson, in conversation; Fisher, 1951) and Molokai (J. D. Smith, letter). The possibility remains that the Koloa may still live on Maui where remnants of suitable habitat are found.

Almost all the present Koloa population inhabits Kauai where we estimated 500 birds remain. These figures are derived from our sample counts and information from resident hunters, plantation workers, and other observers. Probably more than half the ducks dwell on the major mountain streams from about 500 to 4,000 feet elevation where we found densities up to four birds per mile of stream. (The Koloa has been reported by Perkins (*op. cit.*) to

live as high as 8,000 feet above sea level; this must have been on Hawaii or Maui as only these two islands reach this height.) Some of its present mountain range receives as much or more than 200 inches of rain annually and at 4,000 feet the mean annual temperature is 60° F. During normal stage the mountain streams are seldom over 20 feet wide and consist of pools three

FIG. 1. Male Koloa or Hawaiian Duck. Kauai. March 23, 1947. This endemic member of Hawaii's avifauna has been practically extirpated from all islands except Kauai, its last stronghold. All photographs by C. W. Schwartz except Fig. 5.

to four feet deep alternating with small falls or shallow riffles studded with small cobblestones and boulders. Occasional patches of smartweed (*Polygonum* sp.) are found among the rocky beds, and grasses (particularly *Setaria* sp. and *Paspalum* sp.) grow among the rocks in the dry portion of the stream bed. The banks are generally heavily vegetated with native forest trees and shrubs and some ferns which trail in the water's edge. These brownish-colored streams are highly acid for the most part and possess very little aquatic vegetation or diversified animal life. Our superficial examination showed that the nymphal stages of damsel and dragon flies, snails (resembling *Melania mauiensis*), aquatic shrimp (*Gammarus* sp.), isopods, and a small leech were abundant. Earthworms were plentiful beneath the moss that covered the rocks above the waterline. This animal life together with the smartweed and grasses mentioned above probably furnishes food for the Koloa in these mountain

FIG. 2. Typical mountain habitat of the Koloa. Waialae Stream, Kauai. Elevation 3,600 feet. October 17, 1946.

FIG. 3. Irrigation ditch in sugar-cane field of the type frequented by the Koloa. Elevation, sea level, on the island of Kauai. November 21, 1946.

FIG. 4. Forested habitat through which many of the mountain streams supporting Koloa flow. Watershed of Koaie Stream, Kauai. Elevation, 3,500 feet. October 3, 1946.

FIG. 5. Mokulua Islands. The Koloa still occasionally nests on these two islets which lie three-fourths of a mile offshore from Oahu. The ducks lead the newly-hatched young to the nearby Kawainui Swamp on Oahu. Photograph by J. D. Smith.

areas. The highly acid, vast Alakai Swamp or Bog which exists between 4,000 and 5,000 feet on Kauai is not reported to support Koloa nor is it said to have been an important habitat of this bird in the past.

The rest of the population on Kauai occurs very sparsely below 500 feet and is found in the reservoirs, major irrigation ditches, the very few remaining marshy areas, the coastal portions of some of the larger streams, and some flooded rice fields. Temperatures in this general zone of low elevation have an annual mean of approximately 70° F., but rainfall may vary from less than 20 to 100 inches annually.

Eight was the largest number of Hawaiian Ducks we saw on any reservoir and this was on the 400-acre Koloa Reservoir. Smaller reservoirs of about two to ten acres occasionally supported from two to three ducks each. These reservoirs generally have fluctuating water levels and are mostly devoid of aquatic vegetation. Although they support some fish (bass, *Micropterus salmoides*, and bluegill, *Lepomis macrochirus*) and other aquatic animal life, their value as habitat for the Koloa appears poor.

From one to two Koloa were observed per linear mile of some of the permanently-fed large irrigation ditches which flow through the sugar-cane fields or connect one field with another. These ditches, from two to four feet deep and approximately ten feet wide, have a certain amount of aquatic life, principally filamentous algae, snails, aquatic insects, and fish (Mexican swordtail, *Xiphophorus helleri*, guppy, *Lebistes reticulatus*, and mosquito fish, *Gambusia affinis*). Our knowledge of the food habits of the Koloa is too limited to evaluate this habitat in terms of food availability but from all indications there is ample food here provided it is not destroyed by poisoning operations. But since the plantations periodically poison the vegetation along these banks as a means of controlling weeds and insects, and also spray the water surfaces to kill aquatic plant growth which clogs the ditches, it is likely that some harm befalls the ducks through loss of nesting cover and poisoning of their food supply. The practice of burning sugar cane prior to its harvest doubtless destroys some nests and ducklings.

The few remaining marshy areas now supporting ducks on Kauai have limited stands of bulrush (*Scirpus validus*) bordering small shallow expanses of open water. The rapid rate of reclamation of these areas will soon eliminate the birds from this habitat.

The fact that Kauai now has a larger population of Koloa than the other islands can perhaps be explained by the following circumstances. The habitat conditions with respect to amount and quality have always been more favorable on Kauai than on the other islands, and the mongoose, whose predation has contributed to the destruction of native ground-nesting birds on other islands, does not occur on Kauai.

On the island of Oahu, the Koloa is occasionally observed in the Kawainui Swamp at Kailua, the Kaelepulu Pond and its drainage area near Lanikai, and on the twin Mokulua Islands offshore of Oahu near Lanikai. These locations are practically all at sea level. Our estimate placed the population at less than 30 birds on Oahu in 1946–1947. Subsequent to our observation, those made by Mr. J. Donald Smith, Territorial Game Conservationist (letter), indicate that the Koloa population on Oahu is still declining.

Only rarely is the Hawaiian Duck observed on some of the reservoirs on the island of Hawaii. Fisher (1951) reported that the Koloa was scarce on Niihau probably because of a decrease in suitable habitat.

The crops of two Hawaiian Ducks we obtained in the lowland sugar-cane habitat on Kauai contained the shells and soft parts of the snail *Melania mauiensis*, and seeds of the grasses *Paspalum Urvillei* and *Echinochloa crus-galli* var. *crus-pavonis*. Two Koloas collected on Hawaii by Henshaw (1902) had their stomachs crammed with two species of fresh and brackish-water snails, *Melania newcombii* and *Hydrobia porrectamigh*. Perkins (1903) reported Hawaiian Ducks to feed on ripe grains of rice, various kinds of molluscs frequenting fresh or brackish water, the larvae of dragon-flies, and other foods accessible to them. Munro (1944) stated that the Koloa fed on earthworms and foraged on grass.

We usually saw the ducks as singles or pairs and only rarely in groups of three or four. The largest number observed at any one time was eight on the Koloa Reservoir referred to above. Our observations and the reports of others indicate that no large flocks are formed at any time of the year now, although in the past post-breeding flocks occurred. Palmer (Rothschild, 1893–1900) observed large flocks on a lake on Niihau, on some occasions not less than 100, and Wilson and Evans (1890–1899) reported flocks in the marshes near Waimanelo, Oahu.

The scant information reported to us concerning the dates of nesting and young suggests that the Koloa breeds throughout the year in both mountain and lowland areas but probably most breeding takes place in the spring. This agrees with Perkins (*op. cit.*) who reported the Hawaiian Duck to be very irregular in its nesting time but with the majority of breeding taking place between March and June. Following breeding the adults molt and years ago it was the custom for the Hawaiians to make annual trips to the mountains where the flightless ducks were easily captured, killed, and salted for future use. According to Mr. Eric Knudsen, a long-time resident of Kauai, two favorite spots for collecting ducks were the Kokee and Waialae regions of Kauai. Forays did not occur frequently into the marshy areas presumably because of the difficulty of catching the birds there.

Nests reported to us have been located in sugar-cane fields, the dense grass border of irrigation ditches, and the grassy slopes of Mokulua Islands. They contain from two to 12 eggs but according to Munro (*op. cit.*) eight is the commonest number. Broods ranging from four to eight young have been observed.

It is of interest that the Koloa nests on the twin islands of Mokulua (whose combined area is about ten acres) and leads its young to Oahu over approximately three-fourths of a mile of open ocean (Munro, *op. cit.*; others, in conversation). These islands are uninhabited by humans.

Two wild specimens we obtained on Kauai (September 26, 1946, and October 10, 1946) were females. The duck secured in September had no bursa. Her ovary contained many yolky follicles, the largest of which was 9 mm. in diameter and her oviduct was enlarged sufficiently to have recently passed an egg. The female acquired in October possessed a bursa 22 mm. in length. Several large yolky follicles, up to 19 mm. in diameter, were present in the ovary and the oviduct was greatly enlarged. Since the presence of the bursa of Fabricius is generally accepted as an indication of an immature duck (Hochbaum, 1942), the breeding condition of this Hawaiian Duck which possessed a bursa is noteworthy.

The September and October females measured, respectively, as follows: total length, 467 mm., 435 mm.; culmen, 45, 45; extent of wing, 707, 750; closed wing, 234, 230; tail, 80, 80; longest toe, 51, 49.

Infestations of lice were light on both birds. Two species, *Trinoton querquedulae* (L.) and *Anaticola crassicorne* (Scop.), identified by Dr. E. W. Stafford of the U. S. Fish and Wildlife Service, were found on the September bird while only the former occurred on the October bird.

Because the Koloa is one of the world's rare birds, every effort should be made to maintain the race. Illegal shooting still constitutes a serious hazard to its survival and rigid protection is absolutely necessary. Some of the remaining marsh areas and possibly some reservoirs, particularly on Kauai, should be improved to provide better habitat. Because the Koloa lives and breeds under captive conditions (one we acquired had been in captivity five and one half years after its capture as a duckling), a supply of these birds could be maintained for strengthening populations in managed range and for stocking suitable but unoccupied areas.

Without doubt the drainage project in progress (1952) of the major marsh areas on windward Oahu will extirpate the duck from that island within the next few years. This will leave Kauai as the last major stronghold of the Koloa. The Board of Agriculture and Forestry of the Territory of Hawaii has incorporated the recommendations given above into its game management

program and is now improving the carrying capacity of water areas on Kauai and Maui and raising Hawaiian Ducks in captivity for release into these managed areas. A small flock of Koloa is also being raised at Kapiolani Park, Honolulu, and a pair of birds has been taken to the Severn Wildfowl Trust, England, for breeding purposes.

Literature Cited

Fisher, H. I.
1951 The avifauna of Niihau Island, Hawaiian Archipelago. *Condor*, 53:31–42.
Henshaw, H. W.
1902 Birds of the Hawaiian Islands, ... T. G. Thrum, Honolulu.
Hochbaum, H. A.
1942 Sex and age determination of waterfowl by cloacal examination. *Trans. 7th N. Amer. Wildl. Conf.*, pp. 299–307.
Munro, G. C.
1944 Birds of Hawaii. Tongg Publ. Co., Honolulu.
Perkins, R. C. L.
1903 Fauna Hawaiiensis: Vertebrata. Vol. 1 (IV). Univ. Press, Cambridge, pp. 365–466.
Rothschild, W.
1893-1900 The avifauna of Laysan, ... R. H. Porter, London.
Schwartz, C. W., and E. R. Schwartz.
1949 A reconnaissance of the game birds in Hawaii. Bd. Agric. and For., Honolulu.
Scott, P.
1951 Key to the wildfowl of the world. Severn Wildfowl Trust, Slimbridge, Gloucestershire, England. 4 pp., XXIII plates.
Smith, J. D.
1952 The Hawaiian Goose (Nene) restoration program. *Jour. Wildl. Manag.* 16:1–9.
Wilson, S. B. and A. H. Evans.
1890-1899. Aves Hawaiiensis: The birds of the Sandwich Islands. R. H. Porter, London.

Conservation Commission, Jefferson City, Missouri, June 18, 1952

BEHAVIOR OF A YOUNG GYRFALCON

BY TOM J. CADE

IN THE course of field work supported by a grant from the Arctic Institute of North America and the Office of Naval Research, I had an opportunity in the last week of August, 1950, to visit the Kougarok region of Seward Peninsula, Alaska. I spent the week at the Rainbow Mining Camp, owned and operated by Frank Whaley and Sterling Montague and located on the Nuxapaga River at its confluence with Boulder Creek. These men owned a pet Gyrfalcon (*Falco rusticolus*), which I was permitted to handle and observe during my stay at the camp.

The history of this bird's capture and treatment in captivity is about as follows. On July 4, while on an excursion up the Nuxapaga River, Mr. Montague discovered a falcon aerie located on a steep bank in a bend of the river near Goose Creek. One of the parent birds, presumably the female, was shot on the nest. A single downy nestling found at the nesting site was taken back to camp and kept in a chicken-wire enclosure 3×5 feet in surface area, 3 feet high, and with an open top. Later, when the fledgling became active, a cross-bar perch was provided. Also a rag dummy was affixed to a pulley affair, by which it was jerked up and down in front of the falcon to "tease" her. (I judged the bird to be a female on the basis of size.) During the first weeks of captivity the bird was fed entirely on grayling trout and pike, and later, when she began to refuse this diet, on ground squirrels. The young bird had been fed by hand until I intervened and began requiring the falcon to tear her own food and feed herself, a habit which she was reluctant to acquire. As she began to fly, no restrictions were placed on her movements and according to Mr. Montague she had been in the air about a week before my arrival on August 23.

This Gyrfalcon was very gentle and seemed actually to seek human company. Because of this her actions were easy to observe.

Four days after my arrival, I introduced the falcon to the regular lure used by falconers in training their birds. Because of this bird's preference for being fed directly from the hand—and probably also because she was too fat—I had only mediocre success in getting her to respond to the lure. She did learn to eat from it, though never heartily, and she would fly to it from 25 or 30 yards, always landing on the ground by the lure, never attacking it directly with her talons. She would, however, respond readily to almost any other object that I might have at hand to toss into the air, including such things as a hat, gloves, an old sock, a crumpled piece of paper, or a stick. At most times of the day, whether well-fed or hungry, she would

chase such objects vigorously, striking them hard with her talons wherever they fell to ground. She would clutch my hat just as a wild falcon does its prey and attempt to tear it to pieces with her beak. By tossing a hat she could almost invariably be called from distances up to about 300 yards.

Because she would not respond well to the lure I decided to leave her alone until she had developed more interest in attacking and plucking her own prey.

As she began to develop speed and assurance in her flying, I often saw her attacking low bushes or clumps of grass. She would swoop suddenly down a slope, strike a bush, usually breaking off a branch, which she carried away in her talons, and then rise back up to her former position, all the while uttering high-pitched, rattling screams. Or she would fly into a clump of grass, strike it hard with both feet, tussle with it as though it were trying to escape, and go through the motions of breaking the neck or biting the head of her imaginary quarry, spreading her wings and tail over the clump in the characteristic attitude of a hawk hovering over its kill. Clods of dirt, conspicuous stumps, almost anything obvious in its relief received the same attention. She entered into these activities with an aggressive attitude.

During the latter stages of this period I once saw her chase a Robin (*Turdus migratorius*), and on several occasions Fox Sparrows (*Passerella iliaca*), Savannah Sparrows (*Passerculus sandwichensis*), and ground squirrels (*Citellus* sp.).

On August 28, the falcon followed me down to Goose Creek to the location of her parents' nesting site. Sitting on an outcropping of the lava flow across the river from the aerie was an adult Gyrfalcon—presumably the surviving parent. As soon as the wild falcon saw the tame bird in the air, it flew up to meet the newcomer. It rose above the pet bird and stooped in an attack, but the young falcon easily avoided the stoop by quickly maneuvering to one side, the attacking falcon thus falling below, leaving the advantage of altitude to the younger bird. The pet falcon then stooped at her parent (the first real stoop I had seen her execute), but pulled out of her dive before striking the older bird. There continued for several minutes the most spectacular and intense aerial "combat" that I have ever witnessed between two birds, each falcon attempting to rise above the other for the advantage of a stoop. Neither bird ever scored a hit and that did not seem to be their intention.

In the air the two were readily distinguished by their marked difference in size, the pet bird being considerably larger. This seemingly confirmed my opinion that the young bird was a female, while the parent seemed to be a male. They were also easily distinguished by their cries—those of the young falcon being much higher in pitch and more "squeaky" than those of the mature male.

In this combat the young falcon clearly had the advantage a larger percentage of the time, making three or four stoops to every one of the other. On two later occasions these two Gyrfalcons met in the air over Rainbow Camp to do battle. In each of these instances the juvenal bird appeared to come out victor, finally driving the adult away.

In the next few days the young falcon also had encounters with a Rough-legged Hawk (*Buteo lagopus*), a Marsh Hawk (*Circus cyaneus*), and a Pigeon Hawk (*Falco columbarius*). The Rough-legged Hawk and the Marsh Hawk were helpless against her attacks and could do nothing but flounder through the air until she tired of her activity. As far as I could determine she did not actually strike either of these birds, though presumably she could easily have done so. The Pigeon Hawk, however, was a different matter. Being smaller and more maneuverable, and perhaps just as swift, this little falcon easily kept above the Gyrfalcon and drove her mercilessly for several minutes until she was forced to seek shelter on the porch of the cook shack.

Two Herring Gulls (*Larus argentatus*) flying up and down the Nuxapaga River were attacked by the young falcon in the manner described above and were forced to take refuge by alighting in the water and waiting there until the falcon left the vicinity. Seven young Red-throated Loons (*Gavia stellata*) huddled in a group in the river were attacked and forced to retreat by diving.

On August 31, I left Rainbow Camp and could make no further observations on the behavior of this falcon.

Discussion

Two aspects of this falcon's behavior are worthy of additional comment—her attacks upon inanimate objects and her abortive attacks upon living animals with no apparent intent to kill. These behaviors possess most of the "commonly accepted characteristics" of play critically reviewed by Beach (1945:523–524): (1) they appear to express emotion or pleasure; (2) they are characteristic of an immature animal; (3) they do not terminate in immediate biologically significant action; and (4) they appear to be youthful attempts at adult activities. Beach rightly points out, however, that no one criterion, or one set of criteria, can be applied generally to playful behaviors in animals. This is especially important to keep in mind when comparing the behavior of birds and mammals, as Thorpe (1951:23) has indicated in regard to juvenile play.

Thorpe (1951:29) mentions in a footnote a paper in Dutch by L. Tinbergen in which he describes almost exactly the same sort of "playful hunting of inanimate objects by young Kestrels [*Falco tinnunculus*]," mentioning specifically such objects of attack as pine cones and grass roots. It should be pointed out, however, that these falcons were already engaged in the normal

amount of hunting activity for food. Bond (1942:87) discusses some similar activities of a captive young Goshawk (*Accipiter gentilis*) under the heading "Play," although he was not sure that a close analysis of the behavior would warrant the use of the term. M. W. Nelson (letter and oral communication) tells me he has frequently seen the same behavior indulged in by eyass Peregrines (*Falco peregrinus*) and Prairie Falcons (*Falco mexicanus*) in the Western States—mentioning specifically such objects of attack as sticks, clods of dirt, and horse manure. I have seen comparable antics performed by young Peregrines about their aeries along the Yukon River. Finally, Munro (manuscript) has observed a Prairie Falcon, of undetermined age, in British Columbia "playing" with cow manure, alternately swooping down, picking it up, dropping it, and picking it up again. Such behavior, therefore, seems to be frequent and widespread among the falcons, particularly among the juveniles, although Thorpe (1951:29–30) reached the conclusion that play generally is more prevalent among adult birds. M. W. Nelson (letter) tells me of one trained adult Peregrine that was extremely playful, and Bond (1942:87) mentions the case of Stabler's trained Goshawk, which showed "no diminution of play" at nearly five years of age.

Accounts of falcons and other hawks attacking live animals in a sportive or playful manner are so numerous in the literature that I think they need not be reviewed in this paper. Bent's "Life Histories" (1937; 1938) contain several.

These two kinds of aggressive behavior were categorized by Groos (1898: 120) under "Hunting Plays." The behavioral similarity of these responses to those of actual hunting led Groos (1898:75–76) to assume that they provide exercise and practice in perfecting the necessary skill to secure food. There seems to be little factual evidence to support this assumption at present, and it has been experimentally demonstrated that youthful practice is not necessary for the perfection of some types of behavior (Beach, 1945:535). But even should it be shown that play does perfect utilitarian behavior this would not explain the stimulus-response relationship involved.

Rand (1951:524–525) has shown the futility of attempting simple explanations of this type of behavior, pointing out that it may be "at times, the attack on an enemy; at times a response to a strange object; at times the result of over-belligerence; and at times play." He stresses variable and multi-factorial causation.

In the instances of attack upon inanimate objects, one wonders whether or not such behavior derives largely from "internal stimulation" and is akin to the type of behavior called *Learlaufreaktion* by Lorenz and "energy-accumulation activity" by Armstrong (1947:119). If such attack is primarily an instinctive reaction, one might hope to explain this behavior in terms of the

"releaser" school of thought. (See Tinbergen (1948) for a review of the basic concepts.) But then one is left in ever greater wonder, as Munro (manuscript) suggests, as to just what the stimulating nature of such objects as a hat, a sock, a clump of grass, or a clod of dirt might be to release aggressive behavior so nearly like actual hunting attacks. If one attempts an explanation in terms of recent conditioning theory (Skinner, 1938; 1950) then one must wonder how the probability of such behavior is increased by the "reinforcement" of non-utilitarian objects.

In the case of the young Gyrfalcon's attacks on living birds, the "combat" between the adult and the juvenile and between the young falcon and the other hawks might be ascribed to some sort of territorial defense on the part of the juvenal Gyrfalcon; and her attacks upon potential prey species merely as abortive or precocious attempts to secure food. There might be a strong case for the first point except that it seems unusual for an established adult falcon to be defeated by a young inexperienced juvenile, especially on the former's own ground. The second point seems to be negated by the fact that the young falcon at this stage of development did not appear to recognize intact birds as food, although it might be argued that the attacks showed recognition of moving objects as food.

The whole category of behaviors called play, particularly as manifested by birds, needs clarification. Beach (1945:538) emphasizes the importance of experimental definitions, and Thorpe (1951:28–30) has recently discussed play in birds in relation to learning abilities, pointing out on the one hand the need for distinguishing between cases of *Leerlaufreaktion* and true play and, on the other hand, between play and behavior that appears in the normal course of maturation. It seems to me that falcons and other hawks, birds that have highly developed and variable behavioral responses, are excellent subjects for such inquiry.

I wish to express my appreciation to W. H. Thorpe and R. M. Bond for critically reading the manuscript.

Summary

The behavior of a young, pet Gyrfalcon was observed from August 23 to 30, at a mining camp in the Kougarok region of Seward Peninsula, Alaska. This behavior consisted of (1) attacks on inanimate objects and (2) abortive attacks on living animals. References to similar behavior for other species of falcons and for the Goshawk are cited for the first type. It is shown that these behaviors fall within the category of responses generally called "play." Various possible interpretations of this type of behavior are discussed, but the present data are too meager for positive conclusions.

Literature Cited

Armstrong, E. A.
1947 Bird display and behavior. An introduction to the study of bird psychology. New York. Oxford University Press.

Beach, F. A.
1945 Current concepts of play in animals. *Amer. Natur.*, 79:523–541.

Bent, A. C.
1937 Life histories of North American birds of prey. Part 1. *U. S. Natl. Mus. Bull.* 167.
1938 Life histories of North American birds of prey. Part 2. *U. S. Natl. Mus. Bull.* 170.

Bond, R. M.
1942 Development of young Goshawks. *Wilson Bull.*, 54:81–88.

Groos, K.
1898 The play of animals. New York. D. Appleton and company.

Munro, D. A.
Ms. Prairie Falcon *Falco mexicanus* "playing." Unpubl. Manuscript.

Rand, A. L.
1951 On enemy recognition. *Auk*, 68:524–525.

Skinner, B. F.
1938 The behavior of organisms. New York. Appleton-Century.
1950 Are theories of learning necessary? *Psychol. Rev.*, 57:119–132.

Tinbergen, N.
1948 Social releasers and the experimental method required for their study. *Wilson Bull.*, 60:6–51.

Thorpe, W. H.
1951 The learning ability of birds. *Ibis*, 93:1–52 and 252–296.

Alaska Cooperative Wildlife Research Unit, College, Alaska, May 13, 1952

NESTING ECOLOGY OF THE PIED-BILLED GREBE IN NORTHWESTERN IOWA[1]

BY FRED A. GLOVER[2]

I OBTAINED nesting data on the Pied-billed Grebe (*Podilymbus podiceps*) from March to September, 1948, at Smith's Slough, Dewey's Pasture, and Mud Lake, typical prairie pot-hole marshes about four miles north of the

FIG. 1. Uncovered Pied-billed Grebe nest near Ruthven, Iowa, June 10, 1948.

town of Ruthven, Palo Alto County, Iowa. I am indebted to Dr. H. M. Harris, Head of the Department of Zoology and Entomology, Iowa State College, for encouragement during the work and to Dr. William Stadelman, Washington State College, for aid in searching for nests.

---

[1] Journal Paper No. *J-2068*, Proj. No. 496, Iowa Agricultural Experiment Station, Ames, Iowa. U. S. Fish and Wildlife Service, Iowa State College, Iowa State Conservation Commission, and Wildlife Management Institute cooperating.

[2] Formerly of the Iowa Cooperative Wildlife Research Unit, Department of Zoology and Entomology, Iowa State College; now at Humboldt State College, Arcata, California.

Migration

In 1948, I first saw Pied-billed Grebes in the northwest Iowa lake region on March 29. This was approximately one week earlier than the date of earliest spring arrival given by Larson (1925) and two weeks earlier than Spurrell's (1917) earliest record for Sac County, Iowa. In the first week of their spring migration, I recorded less than a dozen individuals. Other spring migrants arriving in the area about this same time were the Lesser Yellow-legs (*Totanus flavipes*), Pectoral Sandpiper (*Erolia melanotos*), Wilson's Snipe (*Capella gallinago*), Great Blue Heron (*Ardea herodias*), and Whistling Swan (*Olor columbianus*). I noted an influx of about 200 grebes the second week in April. At this time, open water areas in the marshes that were relatively free of vegetation and varying in depth from 15 to 25 inches constituted the type of habitat used by the grebes. As nearly as I could determine by daily censuses, approximately 1,000 Pied-billed Grebes passed through the research area during spring migration in 1948.

Courting

The first evidence of courting and subsequent pair formation that I observed was on one of the ponds in Dewey's Pasture on April 20. My observations of Pied-billed Grebes indicated that they utilized the open-water areas in the marshes for courting. For the most part, the courting behavior was as follows: The male grebe, with his head held low and his bill slightly above the surface of the water, approached the female by swimming slowly. The wings of the male were arched slightly during his approach. When the male was about four feet from the female, he dived and came up at the side but slightly to the rear of the female. The female then made a short dash, varying from four to ten feet, propelling herself with rapid movements of the feet and wings. The male quickly followed and overtook the female at the end of her short dash. As the male then climbed on the female's back, she lowered the front part of her body and extended her neck, seemingly to offset the weight of the male. In lowering the front portion of her body, the female raised her tail slightly. The male grasped her at the nape of the neck with his bill and by beating his wings rapidly and using his feet maintained his balance on the back of the female. With both birds rolling considerably in the water, they united in copulation. The female was entirely submerged during the brief period of copulation.

Sometimes the male was thwarted in his courting attempts by the unreceptive female suddenly diving at the end of the short dash rather than remaining on the surface. In such cases, the male immediately dived and followed the female, but I did not observe copulation to follow this sequence of events.

On May 26, I recorded a pair of Pied-billed Grebes that copulated at least six times in one day. On another occasion, a pair copulated three times in less than five minutes.

The peak of the breeding activity, as shown by courtship and copulation, occurred during the last week of May and the first three weeks of June. Courting antics were not limited to the early part of the breeding season. In fact, I recorded Pied-billed Grebes in courtship, with decreasing regularity, up to August 5.

Territoriality

Pied-billed Grebes exhibited territorial behavior about their nests and I plotted a total of 44 territories. The area defended usually was included within an arc of about 150 feet around the nest. Since male Pied-billed Grebes are slightly larger than females, I could determine that the male was usually the one that defended the area. However, I observed the female to "back up" the male several times in his defense. In one instance a female defended her nesting territory against the intrusion of a coot. The female grebe pursued the coot for about 15 feet and then returned to the vicinity of the nest. Beyond the territorial limits, both sexes joined with other Pied-billed Grebes to feed together without strife. Most of the nests I located were near the shoreline and territorial defense was common in that area, but in the deep, open-water areas, I observed as many as eight pairs feeding together without conflict. The home range or area utilized for carrying on the daily activities was usually about twice the size of the nesting territory.

Nesting

From April 25 to 30, 1948, I found the nests of Pied-billed Grebes in all stages of construction on the study area. As nearly as I could determine, the male assisted the female in nest construction by gathering nesting material. The bulk of the nest material, however, was gathered by the female in the immediate vicinity of the nest. After forming a crude, circular platform of old but buoyant vegetation, frequently bulrush stems grown the previous year, the female continued to build the platform into a truncated cone until it would support her weight above the water. Then while standing in the center of the platform, she pulled the old, rotted vegetation up around the edges to form the cup. The water-soaked vegetation was pulled from the outside and draped towards the center. The time required for completion of the nest varied from three to seven days and appeared to depend upon the availability of nesting materials and possibly the physiological development of the individual female. Completed nests were sodden masses of decaying, aquatic vegetation (Fig. 1).

I took measurements on 138 Pied-billed Grebe nests in the course of this study and tried to determine the relationship of the nest site to the physical surroundings (Table 1). Eighty-seven per cent of the nests I located were within 50 feet of an open-water area in the marshes. The mean distance from nest to open water was 25.8 feet.

TABLE 1

LOCATION OF 138 PIED-BILLED GREBE NESTS, RUTHVEN, IOWA, 1948

Distance to Shore		*Distance to Open Water*		*Water Depth*	
Feet	Nests	Feet	Nests	Inches	Nests
1–100	63 (45.7%)	1– 20	84 (60.8%)	1–10	19 (13.7%)
101–200	16 (11.6%)	21– 40	26 (18.9%)	11–20	55 (39.9%)
201–300	13 (9.4%)	41– 60	14 (10.2%)	21–30	32 (23.2%)
301–400	13 (9.4%)	61– 80	6 (4.3%)	31–40	26 (18.9%)
401–500	33 (23.9%)	81–100	8 (5.8%)	41–50	6 (4.3%)

Egg laying began about the first week of May and I recorded the first nest with two eggs on May 2. I located a total of 137 nests that were built by Pied-billed Grebes but not utilized. This indicated that each pair of nesting pied-bills probably built at least two nests during the course of the breeding season, one apparently as an early nesting attempt while the other was the true nest with eggs. Data on the rate of egg laying revealed that usually one egg was laid each day but that sometimes a day was skipped towards the completion of the clutch. Mean measurements of 102 eggs were 43.53 ± 0.69 by 30.85 ± 0.44 mm. The size of the clutch varied from two to ten eggs with the mean for 97 successful clutches being 6.18 ± 0.40 and for 41 unsuccessful clutches, 4.34 ± 0.63.

During the period of egg laying and in the early stages of incubation, the grebes gave slight attention to the nest. This information I obtained by using a thermocouple concealed in the center of a nest containing a clutch of five eggs that had been incubated at least two days. The female came to the nest several times during the morning and late afternoon to rearrange or add material. On only four visits to the nest did the female attempt to incubate the eggs, and eight minutes was the longest time spent upon the eggs during this stage of incubation. Unfortunately, the nest was destroyed four days after the first data were collected and time did not permit further investigation along this line. Deusing (1939) reported that in the latter stages of incubation both sexes assisted in incubation and left the nest only for brief periods.

Just prior to the time of hatching, I observed the female removing the loose, protective covering of vegetation from around the eggs and making the interior of the nest smooth by adding small quantities of fibrous, green algae. The hatching period for a typical clutch of six eggs was spread over two days. From the first sign of pipping to the actual emergence of the young took from one-half hour to two and a half hours depending upon the climatic conditions. Each young emerged from its shell about as fast as its down dried. The embryonic membranes were shed last over the tail and around the anus. The first young of the season, which appeared to be two to four days old, I observed on June 16 on Smith's Slough. I think that the peak of hatching time was about June 26, but nests with eggs were recorded to August 8.

Productivity

Of the 138 Pied-billed Grebe nests with eggs examined in this study, 70.4 per cent (97 nests) were successful. A mean clutch of 6.18 ± 0.40 eggs were deposited in the 97 successful nests; of these 5.58 ± 0.46 hatched. From these data, I judged that approximately 541 young were produced from the nests studied.

Nest Losses

I attributed about 50 per cent of the nest destruction during the 1948 breeding season to climatic conditions such as wind and wave action and fluctuating water levels. Raccoons (*Procyon lotor*) were responsible for approximately 25 per cent of the nest destruction and were the major predator on the Pied-billed Grebe nests.

The location of the nest site seemed to affect the degree of nesting success. The 97 successful nests that I located were at a mean distance of 305.68 feet from the shore while the 41 unsuccessful nests had a mean distance from shore of 110.63 feet. Application of the "t" test to the data revealed a significant difference in the means ($t=66.34$, .01 level$=2.610$). My field observations substantiated these data, for the nests located nearest to the shoreline were those that both received the greatest predator pressure and were subjected most to stranding by fluctuating water levels. I did not find any significant correlation between nesting success and the distance the nest was located from open water. However, I did find a significant difference between successful nests (mean depth 24.2 inches) and unsuccessful nests (mean depth 16.4 inches) with regard to water depth at the nest site ($t=8.439$, .01 level$=2.610$).

A comparison of the nest measurements between successful and unsuccessful nests showed only slight and seemingly insignificant differences in construction.

Data on the 138 Pied-billed Grebe nests revealed the following general measurements: outside diameter, 15 inches; inside diameter, 5 inches; height of cup rim above waterline, 3 inches; bowl depth, 2 inches; and thickness of material under bowl, 2 inches.

Nesting Cover

From data obtained on 85, 1/4000-acre quadrats (measuring 3.3×3.3 feet), I was able to make a quantitative evaluation of the nesting cover utilized by the Pied-billed Grebe. I located each quadrat or vegetation study plot with the nest as the center and the sides oriented with the cardinal points of the compass. For each quadrat I recorded: the species of plants present, vegetation height, frequency of plant stems, per cent of plot cover formed by each plant species, and basal area of each plant species. I also made estimates of the density of the surrounding vegetative cover and the amount of floating, dead vegetation present in the water. Nineteen species of plants occurred in the 85 quadrats, but only six species were present on 20 per cent or more of the quadrats. The data are summarized in Table 2. Gabrielson (1914) reported that Pied-billed Grebes also utilized cattails (*Typha* sp.) for nesting cover.

Table 2

Nesting Cover Analysis of 85, 1/4000-acre Quadrats, Ruthven, Iowa, 1948

Plant Species	*Stem Frequency*				*Per cent of cover*		*Basal Area (square inches)*	
	Total	Plots	Mean	Range	Mean	Range	Mean	Range
Eleocharis macrostachya	17,705	46	384.8	13–1272	56.0	3–100	2.87	0.25–7.50
Scirpus acutus	5,967	33	180.8	4– 460	77.6	1– 50	4.16	0.50–7.00
Scirpus heterochaetus	4,300	20	215.0	6– 821	49.3	1– 90	3.87	1.00–9.75
Sparganium eurycarpum	2,283	18	126.8	8– 469	40.3	3–100	3.44	0.50–8.50
Sagittaria cuneata	619	21	24.7	2– 115	8.9	2– 30	0.92	0.25–3.00
Scirpus validus	611	29	21.0	2– 52	19.3	1– 50	1.54	0.10–3.50
Scirpus fluviatilis	591	15	39.4	2– 149	30.5	2–100	2.10	0.25–7.50

Not only was a wide variety of plants utilized by the grebes for nesting cover, but I noted also that there was considerable variation in the frequency, height, basal area, and per cent of plot cover of the various plant species on the quadrats. The mean number of plant stems per quadrat in utilized nesting cover was 396.8 stems with a range from 0 to 1,272 stems. The relatively high vegetation density used for nesting indicated that the grebes utilized the "fringe cover," which was characterized by the abundant spike rush (*Eleo-*

charis macrostachya). Statistical analysis of the pertinent data revealed no significant correlation between nesting success and vegetation density at the nest site.

Discussion

Since vegetation density did not apparently affect the nest success to a statistically significant degree, I believe that manipulation or control of the water levels to obtain the greatest development of vegetation consistent with optimum water levels would reduce the destructiveness of the climatic factors and would assist in reducing nest losses. Similarly, water level control to the point where fluctuations were at a minimum would also benefit the nesting Pied-billed Grebes. Increased trapping of fur bearers may alleviate some of the predator pressure on the nesting population.

Summary

1. Pied-billed Grebes arrived in northwest Iowa during the last week of March in 1948.

2. Breeding activity reached its peak during the last week of May and the first part of June.

3. Sometimes both sexes of Pied-billed Grebes took part in the defense of their nesting territories, but the male usually defended the area.

4. The Pied-billed Grebe nest was a floating, truncated cone of water-soaked vegetation and required from three to seven days for construction.

5. Over 85 per cent of the nests were located within 50 feet of an open water area in the marshes, the mean distance being 25.7 feet.

6. Egg laying began about the first week of May, 1948.

7. Of the 138 nests I examined, 97 (70.4 per cent) were successful. Approximately 541 young hatched from these nests.

8. Inclement weather was the major factor affecting nest loss (50 per cent).

9. The raccoon was responsible for about 25 per cent (10 nests) of the nest loss.

10. Analysis of the data indicated that those nests located near the shore were least likely to succeed.

11. Pale spike rush (*Eleocharis macrostachya*), hard-stemmed bulrush (*Scirpus acutus*), and soft-stemmed bulrush (*Scirpus validus*) occurred on more nest-containing quadrats than did other plant species.

12. Manipulation of the water levels appears to be the best means of making northwest Iowa marshes more attractive to breeding Pied-billed Grebes.

Literature Cited

Deusing, M.
1939 Nesting habits of the Pied-billed Grebe. *Auk*, 56:367–373.
Gabrielson, I. N.
1914 Pied-billed Grebe notes. *Wilson Bull.*, 26:13–14.
Larson, A.
1925 The birds of Sioux Falls, South Dakota, and vicinity. *Wilson Bull.*, 37:18–38 and 72–76.
Spurrell, J. A.
1917 Annotated list of the water birds, game birds, and birds of prey of Sac County, Iowa. *Wilson Bull.*, 29:141.

Humboldt State College, Arcata, California, October 1, 1951

THE WILSON ORNITHOLOGICAL CLUB LIBRARY

The following gifts have been recently received. From:

William J. Beecher—3 reprints
A. J. Berger—1 pamphlet
E. Alexander Bergstrom—1 book
W. Frank Blair—1 reprint
Edgar P. Chance—6 reprints, 1 magazine
Allan D. Cruickshank—1 pamphlet
Karl W. Haller—5 books, 1 reprint
Leon Kelso—40 pamphlets, 1 book
Emerson Kemsies—2 reprints
Henry C. Kyllingstad—1 book, 24 reprints
Karl F. Lagler—5 reprints
Harrison F. Lewis—1 book
William A. Lunk—1 reprint
Robert M. Mengel—7 reprints
W. I. Mitchell—40 magazines
Burt L. Monroe—67 magazines
R. Allyn Moser—130 reprints
Margaret M. Nice—20 reprints, 4 magazines
William H. Phelps—2 reprints
Provincial Museum of Natural History, Victoria, B.C.—1 book
Sociedad de Ciencias Naturales La Salle—4 pamphlets
Robert W. Storer—1 reprint
Phillips B. Street—7 reprints
Wendell Taber—1 reprint
H. B. Tordoff—12 reprints
J. Van Tyne—15 reprints
George G. Williams—1 reprint
Harold B. Wood—4 reprints

GENERAL NOTES

Behavior of a female Eastern Kingbird.—On May 25, 1950, I saw a pair of Eastern Kingbirds, *Tyrannus tyrannus*, together in my study area at Pimisi Bay in central Ontario. On June 3, one of them, apparently the female, began carrying nesting materials to a telephone post that stood in a marshy spot along the highway. The other bird, apparently the male, sat on guard near by and occasionally accompanied the female on her trips to and fro. She placed the material among four insulators at the end of the horizontal crosspiece of the post. Immediately the wind flicked the material away to the ground.

Nevertheless, the female worked with great assiduity. Sometimes she succeeded in braiding a few strands of dead grasses around the insulators so that she could arrange the material, sit on it, and mold it energetically with her breast. But most often, having got thus far, she found herself molding nothing but the bare arm of the telephone post and she departed to return with another load. This unsuccessful building went on for 10 days with never-flagging energy. But at the end of this period, only an odd straw waving from the telephone post and sheaves of them scattered on the ground remained to tell of the kingbird's untiring efforts.

On June 12 she was alone and still building. It became obvious that the male had disappeared, probably the victim of a Sharp-shinned Hawk, *Accipiter striatus*, which hunted in the area. The next day the female had ceased building. She sat on the wires close to the nest-site, preened, and caught insects over the water. At one time she approached a male Red-winged Blackbird, *Agelaius phoeniceus*, whose nest was below in the reeds, uttering "chittering" notes, in the same way as she used to approach her mate. On two other occasions, one of a second pair of kingbirds was seen perched on the wires near the nest-site. But the female did not display, nor did she oppose the visits upon her territory.

On June 23, 11 days after the male disappeared, there was another kingbird perched on the wires with the female. This bird flew off northward and the female followed. But when the two were about 600 feet from the nest-site, the female turned about and came back.

Seven days after this she was still on guard by her post. A Yellow-bellied Sapsucker, *Sphyrapicus varius*, arrived and knocked a tattoo on the post. Immediately she flew at him and chased him back into the woods.

On July 19, 37 days after she gave up nest-building, the female kingbird gave "chittering" notes when the Red-wing male flew past her as she perched on the wire. Shortly after she apparently left the neighborhood, since I no longer saw her on the territory.

Nice, in her study of the Song Sparrow, *Melospiza melodia* (1943. *Trans. Linn. Soc. N. Y.*, 4:216–217), emphasized that in many birds "the attachment to the nest-site and the nest may become so great as to overshadow the attachment to mate, eggs or young." In the case of this female kingbird, with neither mate, eggs, nor young, nor even a nest to embody her tie to the nest-site, she remained faithful to it and defended it to some extent throughout the approximate natural length of her nesting cycle, and on one occasion, even though tempted, she forebore leaving it. Her displays to a male bird not of her own kind, perhaps prompted by the rough similarity to her own mate in coloring, size, and fluttering territorial flights, no doubt was a consequence of an unusual situation.—Louise de Kiriline Lawrence, *Rutherglen, Ontario, July 20, 1952.*

Feeding of Mallards prevented by Crows.—On January 28, 1952, I was observing approximately 250 Mallards (*Anas platyrhynchos*) on a slough one mile north and one and one half miles east of Lawrence, Douglas County, Kansas. Some of the ducks were standing on ice on the slough; others were circling overhead. The ducks on the ice suddenly took flight. The flock then began to alight and forage in a corn field adjacent to one end of the slough. In a few seconds several crows (*Corvus brachyrhynchos*) appeared and circled approximately four feet over the ducks. Almost immediately a crow swooped at a duck, flushed it, and chased it about 20 yards. The other crows also began to chase ducks. The few crows were soon joined by others until there were 20 of them, all chasing the ducks. After five minutes the entire flock of ducks took flight with all of the crows in close pursuit. After following the ducks for perhaps 25 yards, the crows returned and perched on broken corn stalks where they engaged in a short period of preening. They then flew off without feeding. The ducks had disappeared to the south toward the Kansas River.—Dennis Rainey, *University of Kansas Natural History Reservation, Lawrence, Kansas, June 15, 1952.*

Subspecific status of the Common Loon in Florida.—Howell (1932. "Florida Bird Life," p. 73) gives *Gavia immer immer* (Brünnich) as the only race of the Common Loon occurring in Florida. He cites numerous observations but records no specimens preserved nor any reasons for the subspecific identification. His determination of race has been followed by other workers on Florida birds without substantiating data.

I have examined nine specimens from Alachua, Brevard, Citrus, Levy, Marion, and St. Johns counties, Florida, collected between November 13 and June 9. The measurements of four males are: wing 348–364 mm., tarsus 82.5–96 mm. Five females measure: wing 312–328, tarsus 82.5–89.5. These nine birds agree in size with ten breeding United States specimens of the Lesser Loon, *Gavia immer elasson* Bishop. They are decidedly smaller than six skins of the Common Loon, *Gavia immer immer*, from Iceland, Greenland, Labrador, and northern British Columbia. Accordingly I suggest that *elasson* be added to the Florida list and *immer* be removed from lack of evidence as to its occurrence in the state.—Pierce Brodkorb, *Department of Biology, University of Florida, Gainesville, Florida, July 11, 1952.*

Possible commensalism between Myrtle Warbler and Yellow-bellied Sapsucker.—On January 6, 1952, I observed a Yellow-bellied Sapsucker (*Sphyrapicus varius*) feeding on hackberries (*Celtis occidentalis*) in a swamp at Seneca, Maryland. The bird would perch on a limb, then launch into the air and neatly pick off a berry as though catching a flying insect. Once the sapsucker flew with the berry to a nearby tree and spent some time searching up and down the bark. Finally locating a suitable crevice into which it wedged the berry, the bird hammered on the stone, of which the berry largely consists, to extract the seed. A Myrtle Warbler (*Dendroica coronata*) was attracted by the sapsucker as the latter left the tree and followed the sapsucker about closely—within two feet and once within six inches—during the whole time the larger bird hunted for a crevice and worked on the berry. As soon as the sapsucker had flown away, the Myrtle Warbler went directly to the crevice and apparently searched for leftovers. The sapsucker meanwhile picked another berry and flew with it to a tree 50 feet away. The Myrtle Warbler subsequently followed it, coming within six feet, but at this time both birds flew away.—Lawrence Kilham, *8302 Garfield Street, Bethesda, Maryland, July 11, 1952.*

Evening Grosbeak nesting in Montana.—The Evening Grosbeak (*Hesperiphona vespertina*) is a fairly common summer resident of the mountainous portion of western Montana. The nest of this species, however, has to my knowledge not previously been reported for this state. On July 3, 1952, a nest with five partly grown young was found by the ornithology class from Montana State College while they were on a field trip. Both parent birds stayed within a few feet of the nest while it was being inspected.

The nest was about 45 feet from the ground in a dense stand of Douglas fir (*Pseudotsuga taxifolia*). It was composed almost entirely of Douglas fir twigs and was lined with a few rootlets and two horsehairs. The nest was located about four miles north and east of Bozeman, Gallatin County, at an altitude of about 4800 feet.—CLIFFORD V. DAVIS, *Department of Zoology and Entomology, Montana State College, Bozeman, Montana, July 18, 1952.*

Bird notes from the Texas coast.—The following records are based mainly on my observations while I was stationed at the Aransas National Wildlife Refuge, Refugio and Aransas Counties, Texas, from October, 1938, to October, 1941. This 47,000-acre preserve occupies Blackjack Peninsula, which extends into coastal bays of the Gulf of Mexico. I think that the following notes are of distributional interest or significant because of the relative rarity of some species listed in the central section of the Texas coast. Certain western forms referred to below occur at some time of year in the extreme southern part of the state (Brownsville-Harlingen region) but not regularly north or east of that area.

Mexican Grebe (*Colymbus dominicus*).—This grebe now nests regularly at Rockport, Aransas County. Everett Beaty, of the refuge staff, found several pairs nesting at Jones Lake on the refuge in the summers of 1942 and 1943. Several broods were reared. This lake lies 25 miles northeast of Rockport.

White-winged Scoter (*Melanitta deglandi*).—An immature male was shot by Jack Sanders in Aransas Bay near Lamar, Aransas County, December 31, 1940. The specimen is now in the Fish and Wildlife Service collection at the U. S. National Museum.

White-tailed Kite (*Elanus leucurus*).—In view of the rarity of this species in the Central States, mention is made of one seen near Roddy Island on the refuge by Robert P. Allen, the writer, and others, on April 20, 1940.

Swallow-tailed Kite (*Elanoïdes forficatus*).—This is a regular, although rare, migrant in Texas. Everett Beaty saw one on the refuge, March 26, 1940. Another was seen there April 31, 1941, by Albert Nutt.

American Rough-legged Hawk (*Buteo lagopus*).—Casual. A few winter sight records of refuge birds. Bent (1937. *U. S. Natl. Mus. Bull.* 167, p. 284) mentions several sight records and one specimen, the latter from the Aransas River in 1887, for Texas.

Prairie Falcon (*Falco mexicanus*).—A few refuge sight records. One was shot by a Mexican at Rockport, Aransas County, April 16, 1940; the specimen was preserved.

Duck Hawk (*Falco peregrinus*).—This regular winter visitor was observed on the refuge as late as May 30 (1940) and as early as July 21 (1940).

Golden Plover (*Pluvialis dominica*).—While this is a regular spring migrant along the Texas coast, it is rare in autumn. One was seen at Austwell, November 16, 1938.

Hudsonian Godwit (*Limosa haemastica*).—One seen at the refuge CCC camp, May 13, 1939. The writer and Phil Goodrum saw two at the refuge ranchhouse, May 11, 1941.

Avocet (*Recurvirostra americana*).—Common refuge migrant; one nesting record. Robert P. Allen observed a pair copulating at Rattlesnake Point on April 24, 1940. A

nest with four eggs was found there in a clump of saltgrass (*Distichlis*) on May 6. The eggs hatched successfully on May 25 and 26. Bent (1927. *U. S. Natl. Mus. Bull.* 142, p. 45) records the Avocet as breeding rarely to south Texas (Corpus Christi and Isabel).

Northern Phalarope (*Lobipes lobatus*).—This species is extremely rare in Texas. A female was seen at Shallow Lake on the refuge's east shore flats on April 24, 1940, by Everett Beaty and the writer. Another bird was found that day by Robert P. Allen at Rattlesnake Point. Seven birds, including both sexes, were found at Shallow Lake on April 25 and 29, 1940.

Buff-bellied Hummingbird (*Amazilia yucatanensis chalconota*).—This species is rare in the United States outside of the lower Rio Grande Valley in extreme southern Texas. One which fed at some turkscap bushes at the refuge ranchhouse daily from November 8 to 13, 1939, was found dead there November 14. The specimen, an adult male, is now in the Fish and Wildlife Service collection at the U. S. National Museum. It was identified as of this race by Harry C. Oberholser.

Say's Phoebe (*Sayornis saya*).—One observed at the refuge, November 4, 1938. Bent (1942. *U. S. Natl. Mus. Bull.* 179, p. 172) cites winter records east to San Angelo, Laredo, and Brownsville.

Red-breasted Nuthatch (*Sitta canadensis*).—Bent (1948. *U. S. Natl. Mus. Bull.* 195, p. 34) lists southern winter records of this nuthatch in Texas for San Antonio, Knickerbocker (Tom Green County), and El Paso. I saw one at refuge headquarters on October 15, 1941.

Cactus Wren (*Heleodytes brunneicapillus*).—Vagrant. Tarleton F. Smith identified one on the refuge December 13, 1938. Bent (*op. cit.*, p. 231) says that the Cactus Wren is found east to Runge (Karnes County) and Brownsville.

Sage Thrasher (*Oreoscoptes montanus*).—Two seen at Brahma Well on the refuge, December 30, 1938. Bent (*op. cit.*, p. 434) mentions no winter records east of Kerrville, Laredo, and "rarely" Brownsville.

Mountain Bluebird (*Sialia currucoides*).—Six were observed at the Brahma Well, Aransas Refuge, December 13, 1938.

Varied Bunting (*Passerina versicolor*).—Robert P. Allen saw a Varied Bunting in a thicket at Rattlesnake Point on the refuge, April 16, 1940.—JAMES O. STEVENSON, *U. S. Fish and Wildlife Service, Washington, D.C., March 20, 1952.*

Chuck-will's-widow in central Ohio.—At approximately 8:50 p.m. on June 7, 1952, I heard a Chuck-will's-widow (*Caprimulgus carolinensis*) singing close to my home in Upper Arlington, near the Scioto River, Franklin County, Ohio.

The bird sang for about four minutes. The night was cloudless and the temperature 70° F. During the performance I called Dr. Floyd B. Chapman, Ohio Division of Wildlife, on the telephone. He confirmed the identification, stating that he could hear the notes clearly in the receiver. Both Dr. Chapman and I have heard this species many times in southern Ohio and in the southern states.

Upper Arlington is about 85 miles northeast of the only known nesting colony of the species in Ohio, in the Ohio Brush Creek area of Adams County. It might be observed that the central Ohio bird was in a limestone area somewhat similar to the habitat in Adams County. This bird, evidently a straggler, constitutes the northernmost record for the species in Ohio.—WILLIAM M. GILBERT, *2262 Yorkshire Road, Columbus, Ohio, June 22, 1952.*

White-rumped Sandpiper in Indiana.—The status of the White-rumped Sandpiper (*Erolia fuscicollis*) in Indiana has not been fully determined. Until comparatively recent years, little was known of the species in this state. Butler (1897. "Birds of Indiana," *Indiana Dept. Geol. Nat. Resources Ann. Rept.* 22:1173) knew of no record but carried the species on the hypothetical list.

Frederick M. Baumgartner first added the species to the state list with his observation of six birds in Marion County, April 10, 1926 (1931. *Proc. Indiana Acad. Sci.*, 402:298). Two records were obtained in Allen County in 1934, as reported by Frank Johnson (1938. *Yearbook Indiana Aud. Soc.*, p. 65). Harry M. Smith observed it in Lake County in 1936 (1936. "Notes on the birds of the Calumet and Dune Regions," mimeographed paper, p. 12). Donald H. Boyd observed it in Porter County in 1942. I can find no records for the years 1943 to 1948, inclusive.

From 1949 to 1952, inclusive, records have multiplied to such an extent that the White-rumped Sandpiper now appears to be a regular migrant in Indiana in both spring and fall. I have 28 records for that period, from various observers, and seven counties are represented. It has appeared most often in Lake County (13 reports), Marion County (7 reports), and Porter County (5 reports). All of the Lake County records have been obtained from Wolf Lake, which lies on the border of Illinois and Indiana. It has been found with the same regularity across the line in Illinois, as reported to me by T. J. Nork, Albert Campbell, Amy Baldwin, and others.

I took a female at Wolf Lake on July 20, 1950, which is apparently the first specimen for the state. It was one of two White-rumped Sandpipers observed that day and was feeding with a flock of Semipalmated Sandpipers (*Ereunetes pusillus*) along a sandy strip of shoreline. The other was with a group of Least Sandpipers (*Erolia minutilla*) in the same type of habitat. This specimen has been deposited in the Purdue University Wildlife Laboratory Collection, Lafayette, Indiana.

Val Nolan, Jr., has made some interesting observations on the White-rumped Sandpiper (1951. *Indiana Aud. Quarterly*, 29(2):21–22), from which I quote: "On September 8, [1950] at the Indianapolis Sewage Disposal Plant in Marion County, my attention was attracted to ten shore birds dropping from high in the air to one of the settling pits. They flew low over the area several times and finally lit on a pit beside me. Four were White-rumped, six Semipalmated Sandpipers. After resting no longer than thirty seconds the flock arose abruptly, mounted quite high, and flew straight away. The birds seemed to be migrating and to have been attracted for a moment by the pits. This observation was made at 9 a.m.; it had been raining heavily until a few moments before the birds appeared. Many other small shore birds were present on the pits."

Nolan obtained further information on September 14, 1950. Regarding this instance, he (*loc. cit.*) wrote, "I came suddenly upon and frightened away a mixed flock of small shore birds which included several White-rumps. About thirty minutes later I found what was probably the same flock, consisting of five White-rumped, five Semipalmated, and two Least Sandpipers. The birds of the species here under discussion were stepping about on the half-submerged foundation of a building. Their manner of feeding in this particular made them resemble Spotted Sandpipers [*Actitis macularia*]. Occasionally a bird would fly from stone to stone. They were apparently not disturbed by my presence, and I left them still feeding."

James B. Cope and I saw a lone White-rumped Sandpiper in a flock of 19 Semipalmated Sandpipers on a small pond in LaPorte County, June 3, 1951. We were able to study the bird for several minutes as the flock fed along a soft muddy area. It appeared

to feed at the edge of the flock or slightly away from the group, although it flew amidst the group when flushed.

Two White-rumped Sandpipers observed on May 30, 1952, by Charles M. Kirkpatrick, Marvin and Hubert Davis, Richard Phillips, and the writer, were feeding in a rain pool on a cinder flat. Their companions were Semipalmated Sandpipers and Red-backed Sandpipers (*Erolia alpina*). These birds called occasionally while wading about and while making short flights across the pool; the bat-like note was given perhaps six times.

The White-rumped Sandpiper is probably more common in Indiana than the foregoing records indicate. Its habit of accompanying similar, small shore birds in migration may have resulted in its being overlooked in some cases. From present records, it has been observed as early as April 10 (1926), seven times in May, five in June, three in July, six in August, five in September, and last noted October 20 (1951). Each flock of "peeps" should be critically examined for White-rumps. It has been found in small numbers, usually from one to six, but Boyd recorded 24 on one occasion.—Russell E. Mumford, *Route 1, Cortland, Indiana, November 19, 1951.*

"Cataleptic" behavior in the Hudsonian Chickadee.—On the morning of April 13, 1951, near College, Alaska, I saw a group of six Hudsonian Chickadees (*Parus hudsonicus*) in a mixed stand of spruce and birch. I shot three of these chickadees for specimens. One of the birds fell wounded into the snow, fluttering its wings and kicking its legs violently for several seconds. Two of the remaining chickadees, attracted by the actions of this wounded bird, flew down in great excitement. Hopping about on the lower branches of some trees only a few feet from the dying bird, they repeatedly fluttered their wings in the attitude of young birds begging for food and occasionally turned upside down on the branches, fluttering all the while. One of them finally dropped onto the snow, fluttering and jerking very much like the dying bird. As I approached to retrieve the specimen, the uninjured bird recovered and flew to a near-by branch to rejoin its companion, and as I picked up the then dead bird, the other two chickadees remained very near, constantly displaying with their wings. They remained in the area in an excited state for some time after I retreated from the scene.

Instances of unusual behavior are recorded in the literature for several species of *Parus*. Armstrong (1947. "Bird Display and Behavior," pp. 79–80) describes these "for want of better terms" as "shamming dead" and "cataleptic fits." He cites Wellman's note (1938. *Auk*, 55:673) concerning a Black-capped Chickadee (*Parus atricapillus*) that remained unconscious for about four minutes when frightened, and of another one that, when threatened by a Tree Sparrow (*Spizella arborea*), reverted to a cataleptic seizure similar to the one here described. More recently Hickey (1952. *Auk*, 69:88) has given an account of similar behavior of Black-capped Chickadees at her banding station, in which she cites also published descriptions of similar instances for *P. atricapillus* by Odum and for *P. hudsonicus* by Pettingill. Of a somewhat different but perhaps related nature is the account by Hunt (1951. *British Birds*, 44:278) of a female Great Tit (*Parus major*), which, while engaged in a wing-quivering displacement-display, induced the mounting response of a male Chiffchaff (*Phylloscopus collybita*).

From these accounts it is evident that several species of *Parus*, in widely separated regions of the world, are similarly affected by some sort of nervous seizures under emotional stress. It seems that such behavior would be distinctly dysgenic in nature.—Tom J. Cade, *Alaska Cooperative Wildlife Research Unit, College, Alaska, May 13, 1952.*

Some bird records of importance from New York.—There are several specimens in the Louis Agassiz Fuertes Memorial Collection of Birds at Cornell University which have not been previously reported, and which should be placed on record. Some corrections to earlier literature are also given below.

Ixobrychus "neoxenus". Cory's Least Bittern. Carpenter, in his summary of known records of this form (1948. *Auk*, 65:80–85), overlooked a specimen taken at Ithaca, New York, which was fully described by Allen (1913. *Auk*, 30:559–561). The Ithaca bird, captured May 17, 1913, was the next-to-last of the 31 known examples of Cory's Least Bittern; the last was taken in Illinois on May 23, 1914 (1915. Eifrig, *Auk*, 32: 98–99).

Stercorarius longicaudus. Long-tailed Jaeger. Eaton (1909. "Birds of New York," 1:118) listed only one definite record of this species from New York, a Long Island specimen in the American Museum of Natural History. Cruickshank (1942. "Birds Around New York City," pp. 221–222) listed an additional specimen and four sight records from Long Island. No specimen from the interior of New York seems to have been reported in the literature. There are two such specimens, both immature, in the Cornell collection. One was found by Peter Mattli on a breakwater at the head of Cayuga Lake in Ithaca, March 8, 1942. It obviously had been dead for some time, and has been preserved in its mummified condition. The specimen was identified by George M. Sutton.

The other Long-tailed Jaeger is from the collection of the late Frank S. Wright of Auburn, New York. It was taken on Owasco Lake, Cayuga County, on September 4, 1908, and remained in the Wright collection for many years as a supposed specimen of *Stercorarius parasiticus*. After the Wright collection was acquired by Cornell, this jaeger was examined by Dwain W. Warner and the writer, and its identification questioned. In 1946, the skin was sent to Robert C. Murphy and to George M. Sutton for reidentification. Both confirmed our suspicions that the bird was actually *S. longicaudus*.

Larus minutus. Little Gull. There is an example of this species in the Cornell collection which has been mentioned only in the local list in Allen's "Ornithology Laboratory Notebook" (1947, p. 50). This specimen appears to be the earliest known inland occurrence of this Old World gull in North America, and the third earliest from New York. It was taken on Cayuga Lake, near Cayuga, on May 20, 1916. An immature female, it was shot by Ludlow Griscom from a mixed flock of Bonaparte's Gulls (*Larus philadelphia*) and Common (*Sterna hirundo*) and Black Terns (*Chlidonias niger*). The specimen was prepared by Fuertes, who did not realize that the bird was anything but an abnormally small Bonaparte's Gull. Its true identity was suspected and confirmed some years later by Arthur A. Allen.

Sterna paradisaea. Arctic Tern. In Griscom's note (1916. *Auk*, 33:319) on the capture of this specimen, the year was given erroneously as 1915. This tern was collected from the same flock of birds as was the Little Gull mentioned above, on May 20, 1916, and was the second specimen for New York.

Dendroica nigrescens. Black-throated Gray Warbler. A male of this western species was taken in a pear tree in Arthur A. Allen's yard in Ithaca on November 15, 1932. A search of the literature and the U. S. Fish and Wildlife Service distribution files revealed no other New York record of this species. It has apparently been collected at only two other localities in eastern North America. One was found dead in Lenox, Massachusetts, December 9, 1923 (Vorhees, 1924. *Auk*, 41:348), and one was collected in Columbus, Ohio, November 15, 1950 (Thomas, 1951. *Wilson Bulletin*, 63:206). It

is noteworthy that all three of these specimens were taken at about the same time of year, long after most eastern warblers had left for the south.

Specimens examined by me in the collections of Cornell University and the American Museum of Natural History indicate that Oberholser (1934. *Sci. Publ. Cleveland Mus. Nat. Hist.*, 1:101) was probably justified in his division of this species into two races on the basis of size, although color differences claimed by Oberholser were not apparent to me. Arizona and New Mexico birds average larger than coastal birds in both wing and tail measurements. The Ithaca specimen is large (chord of wing, 65 mm.; tail, 55 mm.), and would be assigned to the southwestern population for which Oberholser revived the name *halseii* Giraud, should this subspecific division receive general acceptance.—KENNETH C. PARKES, *Laboratory of Ornithology, Cornell University, Ithaca, New York, April 1, 1952.*

Notes on warblers in Colorado.—A female Hooded Warbler, *Wilsonia citrina*, was secured by the writers on May 3, 1952, at Barr Lake, 15 miles northeast of Denver, Colorado. This is believed to have been the first specimen taken in the state although Jean Sutherland (1927. *Bird-Lore*, 29:120) reported seeing a male on May 8 and 9, 1926, at Boulder, Colorado.

Our specimen was collected on the ground where it had been feeding in low weed tangles among the cottonwood trees of the lake shore. The habitual flashing of white in the tail distinguished it immediately from the female of the similar Wilson's Warbler, *Wilsonia pusilla*. The skin, No. 26599, has been placed in the collection of the Denver Museum of Natural History.

Mniotilta varia. Black and White Warbler.—A male was observed singing in the inundated trees of Barr Lake on May 11, 1952, by the advanced ornithology class of the University of Colorado, accompanied by A. Lang Baily and John Flavin. On May 14, three days later, a Black and White Warbler was heard singing in the same vicinity by the authors. This species is considered a rare migrant in the eastern part of the state.

Parula americana. Parula Warbler.—A female of this rare Colorado migrant was seen by Don Thatcher and John Flavin in the willows below the Barr Lake Dam on May 10, 1952. The bird was still there the following day when it was observed by the University class led by Gordon Alexander.

Dendroica magnolia. Magnolia Warbler.—A high-plumaged male was observed by authors at Wray, Yuma County, Colorado, on May 17, 1952. Robert J. Niedrach observed another male on May 18 at his home 12 miles south of Denver. Mr. Niedrach reports that the species was seen there at the same time the previous year. From these and other recent records, we think that the Magnolia Warbler is a more common migrant in eastern Colorado than previously indicated in the literature.

Dendroica pensylvanica. Chestnut-sided Warbler.—The fourth Colorado observation of this species was made by Don Thatcher on May 15, 1951. The bird, a male, was seen at Sloan's Lake Park, Denver, where it was feeding in dense thickets. Previous records are: a male collected by Robert J. Niedrach at Barr Lake, May 16, 1933; a sight observation by Margaret Pritchett near Denver, May 31, 1935 (1939. The Birds of Denver and Mountain Parks. *Colorado Mus. Nat. Hist. Popular Series*, No. 5, p. 141); and a male seen at Boulder by Fred M. Packard, April 29, 1942 (1943. *Auk*, 60:108).—A. LANG BAILY AND ROBERT P. FOX, *Denver Museum of Natural History, Denver, Colorado, June 3, 1952.*

Avocets in Alabama.—On October 15, 1949, Thomas A. Imhof, James Doubles, William E. Jernigan, and Atkeson were checking on migrating shore birds on the western part of the Wheeler National Wildlife Refuge. This refuge, located in the Tennessee Valley of northern Alabama, includes many acres of mud flats, which are used by various species of shore birds. In the late afternoon, while the party was in the Whitesides vicinity of the refuge in Limestone County about two miles north of Decatur, Imhof noted a single Avocet (*Recurvirostra americana*) feeding with a flock of Lesser Yellow-legs (*Totanus flavipes*). All members of the party observed the Avocet.

A close check failed to reveal any previous Avocet records for Alabama and it was considered advisable to collect the bird to verify the record. This was done by Ernest Byford on October 22, 1949, and the specimen is now in the Washington collection of the U. S. Fish and Wildlife Service.

On November 7, 1950, John H. Sutherlin and Henry H. Grammer noted a flock of ten Avocets on a mud flat along the southeastern shore of Garth Slough, in Morgan County, ten miles east of Decatur. The birds were observed at close range and with binoculars. On November 1, 1951, Grammer and both authors observed two Avocets in the same locality.

The occurrence of the Avocet in Alabama in each of three consecutive autumns indicates that the species may be an uncommon, but possibly a regular, fall migrant in northern Alabama.—David C. Hulse and Thomas Z. Atkeson, *Box 1643, Decatur, Alabama, April 22, 1952.*

European Tree Sparrow extending its range in United States.—The European Tree Sparrow (*Passer montanus*) has been included in the state lists of Missouri and Illinois and recent books have described it as localized about St. Louis, with a southern migratory trend into the Horseshoe and Reelfoot Lake areas of southern Illinois and western Tennessee. In 1949, I found a pair of European Tree Sparrows nesting behind a rain pipe on the Hannibal, Missouri, high school, 100 miles north of St. Louis. In 1950, a pair was recorded nesting at Hull, Illinois, 10 miles east of Hannibal. On June 6, 1951, Doctor James W. Chapman, of Jacksonville, Illinois, and I drove around Lake Mauvaisterre south and east of Jacksonville where we located a colony of at least eight pairs of European Tree Sparrows living in holes in soft maple trees about the lake. I believe this is the easternmost and northernmost record to date. Seemingly, the species is extending its range northward.—T. E. Musselman, *Quincy, Illinois, June 21, 1952.*

Chestnut-collared Longspur: an addition to the Louisiana list.—On the morning of March 23, 1952, while crossing a small airfield at Gilliam, Caddo Parish, Louisiana, about 23 miles north of Shreveport, I flushed a flock of six birds. As they bounded through the air, flashing white outer tail-feathers, they uttered a double call-note unlike any with which I was familiar. I approached close enough to obtain a good view of the birds on the ground. One of the six was a male sufficiently distinctive in plumage for me to identify it as a Chestnut-collared Longspur (*Calcarius ornatus*). The others appeared to be females of the same species. I returned in the afternoon and, with the assistance of John P. Everett, succeeded in obtaining a specimen which is now in the collection of the Museum of Zoology, Louisiana State University. This species was last seen on March 30, when I noted a flock of five in the same area. This apparently was a different group as none was in the spring plumage of the male.

Chestnut-collared Longspurs were also found in a pasture at Wallace Lake Dam, 36 miles south-southeast of Gilliam, on March 25 and 26, 1952, by Mrs. H. C. Hearne. I observed a flock of nine birds there on March 27, and five on March 29. None could be found on April 1.

The Chestnut-collared Longspur has not previously been recorded in Louisiana. While it seems unlikely that the species is of regular occurrence here, it should be noted that neither of the areas in which it was found has ever been visited previously during spring migration by an ornithologist.—HORACE H. JETER, *4534 Fairfield Avenue, Shreveport, Louisiana, April 21, 1952.*

Unusual behavior of Tufted Titmice.—On the afternoon of January 25, 1951, while looking for birds in a deciduous woods not far from Lancaster, Fairfield County, Ohio, I squeaked up five Tufted Titmice (*Parus bicolor*). I noticed that four of the five, in flying from tree to tree toward me, kept their wings and tails spread as they alighted, holding this rather extraordinary pose from five to eight seconds. Each time as they flew into a new tree they repeated the procedure. The fifth bird, although scolding and flying along with the others, did not put on the spread-wing act. When I stopped squeaking the birds stopped their spread-wing posing, though they continued to fly from tree to tree about me. I have read no other reports of this behavior in Tufted Titmice, nor have I previously seen this behavior in over 20 years of bird-watching.—CHARLES R. GOSLIN, *726 King St., Lancaster, Ohio, January 31, 1951.*

Pleistocene birds from Haile, Florida.—Vertebrate fossil remains occur in a fresh water deposit in a limestone quarry in Section 24, T 9 S, R 18 E, a little south of the village of Haile, and about four miles northeast of the town of Newberry, Alachua County, Florida. The altitude of the railroad station at Newberry is 83.5 feet. The fossil locality thus lies between the Wicomico (100 feet elevation) and Penholoway (70 feet) terraces of the Sangamon Interglacial Stage of the Pleistocene, as outlined by Cooke (1936. *Jour. Wash. Acad. Sci.*, 21 (21):503–589).

The stratigraphy is as follows:

5. 6 inches: surface layer of dark brown sand
4. 1½ feet: consolidated dark gray sand with charcoal
3. 8 feet: yellowish brown sand
2. 10 feet: bluish or yellowish clay with lenses of fresh water shells
1. White marine sand (Penholoway?).

Strata 2 and 3 both contain avian fossils. All of the birds identified occur in the county today, although the Mallard is present only as a winter visitant. One species had not previously been recorded in a fossil state, and two others were not known from Florida as fossils.

Podilymbus podiceps.—The Pied-billed Grebe is represented by the distal end of a right tibiotarsus and the proximal end of a left ulna, both pinkish brown in color. It has been previously reported from two other Pleistocene localities in Florida (Wetmore, 1931. *Smiths. Misc. Coll.*, 85 (2):12–13), as well as from other parts of North and South America.

Guara alba.—Cervical vertebra, reddish brown in color; collected by Jon L. Herring. The only previous record of the White Ibis as a fossil is that reported by Wetmore (*op. cit.*: 18) from Florida.

Anas platyrhynchos.—Two pale pinkish brown carpometacarpi, the proximal portion of a right one and the distal fragment of a left one. These bones were collected by Coleman J. and Olive B. Goin. The Mallard is widely known from the Pleistocene throughout the Holarctic Region.

Porphyrula martinica.—Distal end of a right humerus, pale pinkish brown. The Purple Gallinule has not definitely been reported before as a fossil, although Winge (1888. *E Museo Lundii,* (2):4) tentatively reported it from the Pleistocene of Brazil. My specimen is slightly smaller than the humeri of two modern birds from Florida. Its measurements are: transverse width through condyles, 6.4; width of shaft, 3.4; depth of external condyle, 3.5 mm.

Gallinula chloropus.—Cervical vertebra, pinkish gray in color; collected by the Goins. The Florida Gallinule has been reported from the Pleistocene of Florida, as well as other localities in North and South America and Europe.

Fulica americana.—Distal end of right tibiotarsus, dark gray in color. The American Coot has already been recorded from three other Pleistocene localities in Florida. Howard (1946. *Carnegie Inst. Washington Publ.* 551:182–183) separated the Pleistocene coots of Oregon as *Fulica americana minor* Shufeldt. This chronoclinal fossil coot had shorter wings and longer legs than the living coot. The only measurement of the tibiotarsus given by Howard is the length, but this is impossible to determine in the fragmentary bone at hand. In my specimen the bone is slightly more slender than the average for modern coots, although falling within the range of variation of modern birds. Its measurements are as follows: breadth through condyles, 7.6; depth of internal condyle, 7.8; depth of external condyle, 7.4; narrowest breadth of shaft, 3.3 mm. More material needs to be studied before the identification can be carried below the species level.

Ammodramus savannarum.—Right humerus, white in color but well mineralized. The Grasshopper Sparrow has not previously been recorded as a fossil. Measurements are as follows: length, 17.8; breadth of proximal end, 4.8; breadth of distal end, 3.5; breadth of shaft at middle, 1.4 mm.—PIERCE BRODKORB, *Dept. of Biology, University of Florida, Gainesville, Florida, April 18, 1952.*

Black snake captures nestling Blue-winged Warbler.—On June 17, 1951, I was photographing Blue-winged Warblers (*Vermivora pinus*) at their nest, about four miles northwest of Brickerville, northern Lancaster County, Pennsylvania. I had taken some 50 feet of motion pictures when a black snake (*Coluber constrictor*) came into the blind from behind me, passed between my feet, and proceeded out of the blind in the direction of the warbler nest. It moved past the nest for a distance of about ten feet, then circled back directly to the nest, swiftly took one of the young warblers, and moved on with the bird held in its jaws.

The adult warblers were not near the nest when the snake first appeared. But before the nearly naked young warbler was removed from the nest both adults were there. They dived swiftly and excitedly over the nest throughout the time the snake was present and for some time thereafter. Meanwhile two of the remaining three nestlings climbed over the edge of the leafy nest and crawled over the ground to a distance of about four feet, where I found them later. One of the young remained in the nest. It appeared as if the behavior of the adult Blue-winged Warblers was designed to lead the nestlings away from danger rather than to drive off the predator.—G. E. GRUBE, *Biology Department, Gettysburg College, Gettysburg, Pennsylvania, April 19, 1952.*

Irazu Junco—a primitive member of the genus.—*Junco vulcani* (Boucard), the Irazú Junco, has been called by A. H. Miller (1941. *Univ. Calif. Publ. Zool.*, 44 (3):233) "the most aberrant species of the genus." He also states (*op. cit.*:372) that *J. vulcani* "appears to represent a primitive, possibly ancestral, stage," but that (p. 233) it would be "highly desirable to compare carefully the internal structure of *vulcani* with that of the other *Juncos*, ..."

In a recent study of the structure of the skull of fringillids (*Univ. Mich. Mus. Zool., Misc. Publ.*, in press), I presented evidence to show that certain peculiarities of the palatal and squamosal regions of the skull of sparrows can be evaluated as to relative primitiveness. Although I concluded that lack of inflation of the squamosal region and incomplete fusion of the palato-maxillaries to the prepalatine bars of the palatines were primitive characters on the subfamily level (in the Fringillinae, as defined by me), I have since noted that the same criteria seem valid for groups of generic level. Of course, the amount of difference between primitive and advanced members of a single genus is much less, and interpretation correspondingly more difficult, than between extremes of a subfamily.

I discussed earlier (*op. cit.*) the functional significance of the various modifications of the palatal and squamosal regions in sparrows. For present purposes, it is sufficient to point out that *Junco vulcani* shows slightly less complete fusion of the palato-maxillaries to the prepalatine bars (except that *J. vulcani* and *J. phaeonotus* are nearly equal in this respect) and also the least inflation of the squamosal region of the species of *Junco* which I have examined osteologically (*hyemalis*, 6 specimens; *aikeni*, 2; *oreganus*, 5; *caniceps*, 5; *phaeonotus*, 4; *vulcani*, 5). Miller's conclusion that *J. vulcani* is the most primitive member of the genus seems substantiated by the structure of the skull of the species.

I should re-emphasize Miller's thesis that the geographic position (Costa Rica to Panamá, in the mountains at and above timberline) of this "primitive, possibly ancestral," junco does not necessarily indicate that the genus originated in Central America. Instead, because of the probably greater environmental stability of southern regions, as opposed to regions nearer to glaciation in the Pleistocene, the modern occurrence of primitive forms in Mexico and Central America, even in genera of more northerly origin, is to be expected (Miller, *op. cit.*:371–372).—Harrison B. Tordoff, *Museum of Natural History, University of Kansas, Lawrence, May 20, 1952.*

Little Blue Herons in northwestern Pennsylvania.—In the afternoon of July 22, 1951, Robert L. Calvin of New Castle, Pennsylvania, Charles J. Shontz of the Pymatuning Laboratory, and I observed two Little Blue Herons (*Florida caerulea*) in adult plumage at Hartstown Swamp, Crawford County, Pennsylvania. The birds were seen in excellent light with a 26 power telescope.

Hartstown Swamp had been drained early in July and by July 22 there were many small pools of water. These small pools were probably rich in aquatic animal life since many Great Blue Herons (*Ardea herodias*), Green Herons (*Butorides virescens*), and American Egrets (*Casmerodius albus*) were concentrated in this area. The Little Blue Herons were observed for one-half hour before they flew northward in the direction of Pymatuning Lake. One adult was observed in the same area on the afternoon of July 29 by Charles J. Shontz.

All Little Blue Herons recorded previously in the area have been immature birds.—John F. Mehner, *Pymatuning Laboratory, Department of Biological Sciences, University of Pittsburgh, September 1, 1951.*

Wing-flashing of the Graceful Mockingbird, *Mimus gilvus*.—During the last several years notes on the wing-flashing of Mockingbirds, *Mimus polyglottos*, have appeared in this journal (1946, 58:206–209; 1947, 59:71–73; 1950, 62:41–42; 1951, 63: 204–206). I am now able to add an observation from which it is clear that this peculiar habit is found also in *Mimus gilvus*, the Graceful Mockingbird. The race *M. g. gilvus* is found in Surinam. It resembles the Northern Mockingbird, *Mimus polyglottos*, but is of a more uniform grayish color; it almost completely lacks the white on the wings and has much less white on the tail feathers. On December 9, 1951, I observed a Graceful Mockingbird on a burned over area on the savanna near Zanderij, Surinam. The bird was foraging on the ground. While pausing between foraging runs, it repeatedly lifted and spread its wings "archangel-fashion," in the same way as described and pictured by Sutton (1946. *Wilson Bulletin*, 58:206–209). Its behavior was like that of its northern relative, *polyglottos*, but the observer receives a different impression. Since *gilvus* lacks the white wing patches of *polyglottos* and the underside of the wing is of a uniform dull grayish white, when the bird flashes its wings there is no sudden exhibition of a striking wing pattern. In fact, there is no "flashing" at all. Indeed, the most striking thing to me was the peculiar movement of the wings when they were spread and lifted. It was this movement that first attracted my attention to the bird.

Halle (1948. *Wils. Bull.*, 60:243) has also reported wing-flashing in the dark-winged, South American Calandria Mockingbird (*Mimus saturninus*).—Fr. Haverschmidt, *P. O. Box 644, Paramaribo, Surinam, February 6, 1952.*

Aerial feeding of the Rusty Blackbird on mosquitoes.—On May 6, 1950, I observed a pair of Rusty Blackbirds (*Euphagus carolinus*), among the first to return that spring, on Blaine's Lake in the vicinity of College, Alaska. They were first seen perched on the floating ice, which still largely covered the lake on that date. As I approached, I saw the two birds repeatedly make nearly vertical flights into the air for about 15 feet and then glide down easily on extended wings. At the peak of their ascents I could hear a distinct "snap" of the mandibles, much like that made by a flycatcher when hawking insects. I watched these birds carefully for several minutes through a pair of 7×50 binoculars at a distance of about 20 yards and was shortly convinced that they were, in fact, catching large mosquitoes in the air. The mosquitoes, which had just begun to swarm over the lakes in rather large numbers, were plainly visible through the binoculars.

It has been known for some time that the Rusty Blackbird is a highly insectivorous icterid (see Beal, 1900, *U. S. Dept. Agric., Bio. Surv. Bull.*, 13:45–49). Recently Beecher (1951. *Auk*, 68:411–440) has described the anatomical adaptations for food-getting in the Icteridae, discussing the principal anatomical correlates of insect-eating in *Euphagus*. It seems likely that the increased kinetics of the upper mandible in this species is a distinct advantage in capturing insects on the wing.

It is not surprising to me to discover that the Rusty Blackbird has the ability to capture insects in the air, although Beal (*loc. cit.*) apparently considered it entirely a ground-feeding species and does not list flying insects among the principal kinds eaten by this bird. His data, however, did not include records for the months of June and July when flying insects are most abundant, and his material apparently did not include samples from far northern latitudes, where, among macroscopic forms, dipterous insects far outnumber other kinds and, therefore, assume greater importance in the diets of insectivorous birds than they do in more southerly latitudes.

It will be of interest to discover whether or not there exist geographic variations in the extent to which aerial feeding is indulged in by various populations of the Rusty Blackbird. In a region where flying insects are predominant over ground types, a behavioral modification for aerial feeding would be much more likely to evolve in this species than in a region where ground insects are more abundant.—Tom J. Cade, *Alaska Cooperative Wildlife Research Unit, College, Alaska, May 13, 1952.*

SEVENTIETH MEETING OF A.O.U.

At the Seventieth Stated Meeting of the American Ornithologists' Union recently held in Baton Rouge the following officers were elected for 1952-53: *President,* Josselyn Van Tyne; *Vice-Presidents,* Alden H. Miller and Ludlow Griscom; *Secretary,* Albert Wolfson; *Treasurer,* R. Allyn Moser; *Elective Members of the Council:* Jean Delacour, Harvey I. Fisher, Herbert L. Stoddard.

The Council elected Robert W. Storer, *Editor* of 'The Auk'; the 1952 Brewster Medal was awarded, by action of the Council, to Dr. John T. Zimmer of the American Museum of Natural History for his research on the systematics and distribution of South American birds, especially those of Peru.

The following Members were elected to the class of Fellows: Emmet Reid Blake, Paul Lester Errington, Elsie Margaret Binger Naumburg, William Henry Phelps, Sr., Robert Winthrop Storer, Albert Wolfson. The following persons were elected Corresponding Fellows: Armando Dugand, Colombia; Jack William Davies Goodall, Santiago, Chile; Alfred William Johnson, Santiago, Chile; Rodulfo Amando Philippi B., Santiago, Chile.

The following Associates were elected to the class of Members: William J. Baerg, Andrew John Berger, William Bertram Cartwright, Howard L. Cogswell, Joshua Clifton Dickinson, Jr., Harold Carsten Hanson, Margaret Brooks Hickey, M. Brooke Meanley, Robert James Newman, Raymond Andrew Paynter, Jr., Phillips Borden Street, George Guion Williams.

The Seventy-first Meeting will be held at the Los Angeles County Museum in October, 1953.

Albert Wolfson

ORNITHOLOGICAL LITERATURE

A CHECK-LIST OF THE BIRDS OF VIRGINIA. By Joseph James Murray. Virginia Society of Ornithology (obtainable from A. O. English, 2803 Rosalind Ave., S.W., Roanoke), 1952:6×9 in., 113 pp. $1.50.

This booklet (paper-bound, photo-offset) will be a definite asset to students of Virginia birds, who have long lacked an up-to-date, competently prepared summary of the avifauna of that state. Students in neighboring areas should also find it useful. A brief preface, a rather extensive and interesting survey of the long history and development of ornithology in Virginia, a short account of physical features and faunal zones (*i. e.*, the Life Zones of Merriam; biomes are mentioned but not discussed), and a selected bibliography are followed in the work by the accounts of 415 forms: 348 species (11 of which are indicated as being of hypothetical occurrence by the use of parentheses), 64 additional subspecies, 13 of them hypothetical, and 3 hybrids (counting Sutton's Warbler).

The accounts, in telegraphic form and usually less than a half page in length, summarize in the briefest possible way the known abundance, distribution, and seasons of occurrence of each form, giving citations for particularly interesting records and the names of authorities for many other statements. In the space employed it has obviously been impossible to give citations for much of the material. A more elaborate edition, said in the work to be under consideration, is to be hoped for.

Apparently most or all of the taxonomic work on Virginia birds has been done by others and has not been critically reviewed by the author. Some of the subspecies listed are of rather tenuous distinctness, or have been included on the basis of one or a few specimens identified years ago. The accounts of the subspecies are headed, in the time-honored fashion, in the same manner as those of the species, a usage that places undue emphasis on the minor categories, and which I hope to see gradually abandoned in the future. A map would have added to the usefulness of the volume.—Robert M. Mengel.

A FIELD GUIDE TO THE MAMMALS. By William Henry Burt and Richard Philip Grossenheider. Houghton Mifflin Co., Boston, 1952:4½×7¼ in., xxiv+200 pp., 24 color pls., 13 black and white pls., 168 maps, and numerous text figs. $3.75.

Occasionally there appears in the literature of field zoology a book of great usefulness to amateur and professional alike. Such a book is the new volume by Burt and Grossenheider. The authors have prepared a handbook employing for the North American mammals the same techniques of illustration and identification as those so successfully employed by Roger Tory Peterson for the birds. Additionally, maps are included which give the known—and in some cases the supposed—geographic distribution of the various species.

The text and maps by Burt are models of brevity and accuracy. Each species account includes a terse statement on characteristics, similar species, and remarks on distribution and habitat. In all, 373 species are treated—a most conservative number. A few other species are mentioned only casually, but for the most part these are small groups of interest mainly to the specialist. With the aims of the authors in mind, such a treatment needs no apology. Subspecies are completely omitted.

The distribution maps will be of great interest to mammalogists. Although the authors freely admit that some inaccuracies probably occur in the maps owing to omissions, com-

missions, and an outright dearth of published information on some species, still the maps are by far the most accurate reflection extant of the recorded facts of mammal distribution—more accurate, in fact, than one would ordinarily expect to find in a work designed primarily for popular consumption. It is always refreshing to find that some authors think that popular science should still be scientific.

The illustrations clearly demonstrate that Mr. Grossenheider is one of the truly outstanding painters of mammals to grace the pages of modern mammalogy. Not only do the illustrations look like the real animals, but to the practiced eye some are readily identifiable to subspecies. Textural qualities, shading, and color patterns are so skillfully treated that, even *sans* background, Grossenheider's animals seem to be alive. Particularly is this true of the smaller mammals, the mice, rats, and squirrels; the paintings of the larger animals, the ungulates and larger carnivores, although better than good, suffer by comparison. The illustrations of the chipmunks, squirrels, microtines, wolves, foxes, and ringtail cat are superb. Grossenheider has also provided a number of text figures that not only enliven the pages, but impart information worth ten thousand words.

Your reviewer can offer no important criticism of this book. The only really objectionable feature is the inferior reproduction of certain color plates. In all three copies examined, the plate of the rabbits is excessively pinkish and the plate of the insectivores is out of register. In two copies the plate of the deermice is out of register. This latter is most unfortunate because the original painting was one of the best of the entire set. Possibly in the interests of simplification, the scientific names of the animals do not occur on the legends of the plates or distribution maps. This will be a decided inconvenience to those professionals accustomed to using scientific names rather than common names, and especially so since for mammals many 'common' names are not in common usage. The bibliography is intended to be only the barest guide to a vast literature, but even so it seems excessively abbreviated. Another unfortunate discrepancy is the omission of Grossenheider's name from the cover although it is given on the title page and the dust jacket as co-author.

On the whole the book is very well done and the authors are to be congratulated. It fills an embarrassing gap in our literature in a highly satisfactory manner and is sure to enjoy a wide appeal.—Keith R. Kelson.

THE WHOOPING CRANE. By Robert Porter Allen. Research Report No. 3 of the National Audubon Society, New York, 1952: 7¾ × 10½ in., xxvi + 246 pp., color frontispiece, 17 black and white pls., and numerous text figs. $3.00 (paper).

This is the third of a series of life-history monographs published by the National Audubon Society. It should be of interest to the general public, as well as to ornithologists, in that it presents, under one cover, a detailed analysis of all available information regarding a species (*Grus americana*) that has been on the "near extinct" list for many years.

The Whooping Crane is discussed under eight major headings: (1) distribution, (2) abundance, (3) migration, (4) food habits, (5) winter life, (6) the breeding cycle, (7) molts, plumages, and anatomy, and (8) survival: protection and conservation. In addition there is an introductory chapter that includes a brief description and the geographic range of each of the cranes of the world.

The paper is adequately illustrated with photographs, paintings and drawings from various contributors, and a series of excellent pen-and-ink drawings by the author. The

figures and tables would be of greater value if they were serially numbered or lettered to permit easy reference in the text.

The author's views regarding the abundance of Whooping Cranes are very interesting. On page 85 he states, "A 'myth of superabundance' has clouded the true facts and may stem from a misinterpretation of some of the early writings on the status of the species. Actually, there is evidence that the Whooping Crane was never observed in large numbers, even one hundred or more years ago." He then points out that the population as of 1869 probably numbered only 1300 birds. According to his calculations we can hope for an increase of only four Whooping Cranes in the next ten years, provided the rate of increase during that period equals that for the years 1940-1949.

A detailed knowledge and understanding of the life-history and ecology of any species is of utmost importance in its successful management. This is especially true in the case of the Whooping Crane, where even a minor error might have disastrous results. The author has taken this into consideration in presenting his suggestions regarding the future management of the Whooping Crane. His recommendations include enlargement of the Aransas Refuge in Texas, minor improvements at the Aransas Refuge to insure further the safety of the wintering birds, development of a refuge on the Platte River in Nebraska, education of the public, and further study.

Some readers will feel that Allen has avoided discussing the issue of placing the remaining Whooping Cranes in captivity in the hope that they might reproduce there satisfactorily. Until further information is accumulated regarding the breeding behavior of these birds, it seems to me that Allen's cautious approach is safest.—Thane S. Robinson.

VOYAGEUR'S COUNTRY: THE STORY OF THE QUETICO-SUPERIOR COUNTRY

A contribution from the Wilson Ornithological Club Conservation Committee

Grand Portage, that mountainous carry from Lake Superior around the rapids of the Pigeon River to Fort Charlotte, was nine miles of as tortured packing as there was on the continent. Even in the old days, it was something to boast about. To say, "I made Grand Portage" set a man apart. The French voyageurs judged a man by the way he took that trail, for two ninety-pound packets was the normal load and no Coureur du Bois who could not take the punishment was worthy of the name. Some men carried bigger loads and bragged of their feats around the campfires of the Voyageur's Highway for years afterward.

Today modern voyageurs again strain sinews in the country of the fur trading days, cruise thousands of miles along the delightful waterways of the international border between Lake of the Woods and Lake Superior. Like the Indians and voyageurs, they too love this country for the beauty of its lakes, its clean glaciated rocks, its tree-lined portages, and fascinating vistas. Primitive maps with great blank spaces are no more. Now there are excellent aerial photographs so accurate that every stream and pond is clearly shown.

Times have changed in the canoe country, but the spirit of exploration and adventure is still there. In spite of logging and fires and exploitation in some parts of it, the area is still surpassingly beautiful and much of it unchanged. There are still the sounds of the wilderness, the wild calling of the loons, the slap of a beaver's tail at dusk. The

White-throated Sparrow still utters its long plaintive notes and the Hermit Thrush makes violin music until dark has settled down. Eagles still soar and scream high above the ridges and back in the pines the Pileated Woodpecker hammers away at old dead snags.

At night the new explorers sit around their fires knowing that the spirits of the men of old are with them. It is still voyageur country, the country of Radisson and Groseilliers, Alexander McKenzie, Verendrye, and a host of others.

The effort to preserve this historic area began forty years ago when W. A. Preston, member of Parliament from Rainy Lake, watched with misgivings the illegal poaching of moose by hunters from the American side of the border. It was he who first conceived the idea of giving protection to the unusual area. Largely through his efforts, Quetico Provincial Park was established in 1909. Shortly afterward, President Theodore Roosevelt created the Superior National Forest directly to the south of the border and adjacent to the Quetico. It was recognized even then that these two areas, a fifth of the Rainy Lake watershed, were a geographical and historic unit even though divided by the International Boundary.

The creation of these two forest preserves gave the entire watershed its present name, "The Quetico-Superior Country." Since that time, there has been a constant effort especially on the American side to keep the Roadless Areas of the Superior National Forest free from the types of exploitation that threatened its uniqueness. The long effort is a remarkable story of the loyalty and devotion of thousands of public-spirited people on both sides of the border, people who realized that here was not only a great economic resource but a spiritual one as well.

When in the early 1920s, roads were proposed into the heart of the Superior National Forest, conservation groups fought them and finally won. As a result the United States Forest Service planned a roadless area of a million acres free from such developments for all time.

In 1925, a proposal was made to create a gigantic power reservoir along the border by building seven dams impounding some of the waters as high as eighty feet. Whole river systems would have been flooded, countless islands, campsites and beaches submerged, thousands of miles of shoreline changed into a morass of dead snags and stagnant water. Arthur Hawkes, newspaperman from Winnipeg and Toronto, was determined that this should not be done. Together with such men as Ernest Oberholtzer of Ranier, Fred Winston, Charles Kelly, and Frank Hubachek, of Minneapolis, they organized Canadian and American support, told the story of the Quetico-Superior to all who would listen. As a direct result of their work, an organization was created known as the Quetico-Superior Council which proposed a long range plan of management based on sound policies of balanced use for all the resources of the area which would perpetuate rather than destroy them. It also proposed a program of land zoning which would preserve the rare wilderness values of the interior lake regions. This plan is now known as the Quetico-Superior Program.

The Canadian and American Legions, aware of the constant threats which faced the area, endorsed this proposal in 1929 and suggested further that the international forest, should it come into being, be dedicated to the war veterans of Canada and the United States who served in World War I.

It was then that the dream of a living memorial was born. This would be different than anything ever proposed, not just another stereotyped monument of concrete and steel, but a wilderness playground dedicated to the youth of the future. Here was something alive and real that would bring happiness to generations, a symbol of the meaning

of freedom itself and the international unity of purpose that had come out of the great conflict.

In 1931, the Congress of the United States passed a law, the Shipstead-Nolan Act, which gave protection to the shorelines of federal lands from logging or flooding on the Minnesota side of the border. The State Legislature followed with a similar law in 1933 giving similar protection to the state lands within the area.

In 1934, President Franklin D. Roosevelt, aware of the great interest in the area and its preservation, appointed the first President's Quetico-Superior Committee to work toward the realization of the program as proposed earlier by the Council, the adoption of sound policies of resource use and the eventual dedication of an International Peace Memorial Forest.

The same year, after nine years of deliberation, the International Joint Commission denied the long pending application for power development. Lawrence Burpee, Canadian historian, then Secretary of the Commission, advised both governments at that time that nothing should ever be allowed to interfere with the broad policies of management as outlined in the Quetico-Superior Program.

After this period, the United States Forest Service began acquiring private lands within the Superior National Forest. To date through this acquisition program and in many other ways the United States government has evidenced its determination to carry this program to completion. In 1948, the Thye-Blatnik Bill authorized an additional half-million dollars specifically to purchase private holdings within the Roadless Areas. At the present time almost 95% of the private lands and developments within the wilderness canoe country have been purchased. Remaining are several camps within the canoe country proper, some private cabins and choice lake properties. Negotiations toward the purchase of such holdings are going forward as rapidly as possible. The Izaak Walton League has contributed over $100,000 during the past eight years toward this program.

The most recent effort to preserve the canoe country was precipitated by the unrestricted use of airplanes to service resorts and to bring fishing parties to the interior. Not only were seaplanes based locally, but they came from neighboring states in ever-increasing numbers. Air traffic became so great that the Forest Service, with the backing of the President's Quetico-Superior Committee, conservation groups, and civic organizations, urged the establishment by Executive Order of an Air Space Reservation over the Roadless Areas of the Superior. President Truman signed the order in December of 1949 and a two year moratorium was given to resorts and flyers before the order went into effect.

On January 1st of 1952, the opponents of the Air Space Reservation announced that they would violate the Executive Order and bring the matter to court. This was done and the defendants appeared before Federal District Court in Duluth. In September, 1952, Judge Gunnar Nordbye rendered his historic decision in which he held that the preservation of the wilderness character of the Roadless Areas was a long established governmental purpose and that the President had the power to issue the order concerned.

Canada has banned from Quetico Provincial Park commercial aircraft flights originating on the American side of the border and it is the hope that eventually other wilderness canoe regions of the watershed will receive similar protection. Both Canada and the United States have seen what unrestricted airplane use can mean to the wilderness character of the interior lakes.

The flyers appealed to a higher court and a hearing was held in St. Louis on March 13, 1953. Pending a decision by the Circuit Court of Appeals, affected resorts will

be allowed air transportation to service their caretakers and to protect their properties, but no commercial use will be permitted. While the flyers and the resorts employing them may carry their fight to the Supreme Court, the Government is confident of ultimate victory.

The utmost vigilance is necessary to preserve this area from continued attacks. Within the past few months a deliberate effort has been made to nullify the gains of the past twenty-five years by proposing that the Forest Service eliminate the 360,000 acres set aside as a No-Cut Area to preserve the last stands of virgin timber along the border, that the land exchange program of the federal government be ended, that the Air Space Reservation be severely modified, that a special use permit be granted for a hydro-electric line into the Roadless Area.

Those who see in the Quetico-Superior Region and its incomparable wilderness interior only an opportunity to exploit its resources, have even suggested recently a modification of the Shipstead-Nolan Law which will permit power development as well as cutting of shorelines.

Until there is an international agreement on wise management and zoning principles for the area, such threats will continue. While the President's Committee, cooperating with the Canadian Quetico-Superior Committee is trying to bring the program to a successful conclusion through study, education, and research, individuals who feel deeply about the region can also contribute much.

During the effort to secure the Air Space Reservation, it was such devoted organizations as the Izaak Walton League, Friends of the Wilderness, Chambers of Commerce, Garden Clubs, Legion Posts, the Ely Rod and Gun Club, Farm Bureaus, and other community organizations which made it possible. The cooperation of such men as Chester S. Wilson, Commissioner of Conservation for Minnesota, Frank Robertson who showed the film "Wilderness Canoe Country" over 500 times, William Magie with his news releases, many of the men of the U. S. Forest Service, and others too numerous to mention, turned the tide.

And so it will be in all future efforts to preserve the area. People who feel deeply that the Quetico-Superior and its wilderness canoe country core is a national heritage worth protecting at all costs, can through their organizations as well as their individual efforts help in achieving the ultimate goal, the establishment of the International Peace Memorial Forest.—Sigurd F. Olson, *Wilderness Ecologist, Izaak Walton League of America.*

THE SCIENTIFIC VALUE OF A GROUP COLLECTION OF LIVE ANIMALS

BY KONRAD Z. LORENZ

This article is reprinted here, with a few minor changes, from The Fourth Annual Report of the Severn Wildfowl Trust, 1950–1951, *with the permission of the author and of the Director of the Trust. In these times when "taxonomy" is often misconstrued by well-intentioned but poorly informed persons, these words of a scientist who has attained singular eminence in the apparently quite different field of animal behavior support and explain progressive systematics very effectively.*—Eds.

All biological science has begun its career with *collecting*, and it is worthy of psychological consideration that nearly all really successful biologists have, in their own lives, gone through a period in which they repeated, individually, the history of their science.

There are very few of them, indeed, who have not been given to collecting, as a hobby, at an early stage of their scientific development. It is not only legitimate, but absolutely necessary, that the study of animals or plants should begin with simply and modestly collecting knowledge of 'all there is' before proceeding to the more ambitious task of causal analysis. If some modern physiologists show a certain tendency to look down on museum collection, systematics, and comparative anatomy, they forget that these particular branches of biological science have given to all others their common fundamental—the theory of evolution.

For certain reasons, which need not concern us here, the study of animal behavior did not, until a very recent date, introduce the evolutionary viewpoint into its consideration—very much to its own detriment. The fact that all the innate traits of animal behavior can—and therefore must—be studied from the common viewpoint of phyletic descent, remained necessarily hidden from scientists who never studied the behavior of a whole group of species, but confined themselves to just one kind of animal, chosen exclusively for the single reason that it was the easiest to obtain, to keep, and to breed. The basic discovery which has since given rise to a new branch of behavior study—Comparative Ethology—is, in itself, very simple: certain innate behavior patterns are not only common to all the individuals of a species, but very often to much more comprehensive groups of animals as well. In other words, these innate behavior patterns have, among the several species, genera, families, and still larger groups of animals, exactly the same type of distribution and, with decreasing relationship, the same grading of similarity into dissimilarity, as we find in the comparison of bodily characters.

From this the important inference is, obviously, that these behavior patterns are just as old as any structural properties whose systematic distribution is about the same. To people who regard animal behavior as something extremely variable and unrestrictedly modifiable these facts seem very surprising and even unbelievable. Yet, so far from being 'slippery stuff' to use in systematic comparison, innate behavior patterns are, in most cases, extremely conservative characters; indeed, much more so than the specific form of bones and other hard structures. What is hardest and least perishable in the museum, need not necessarily be so in evolution.

Let us look at just one example: since the very beginnings of ornithological systematics, the structure and proportions of the skull and bill have been considered as characters of paramount importance and reliability. A group of Anatidae, the so-called 'Geese,' were lumped together on the strength of just one character: in all of them the lamellae of the bill have been converted into sharp, horny teeth in adaptation to grass-eating, while their skull has assumed, for the same reason, a typical high profile, calculated to heighten the chewing pressure of the mandibles. With the true geese, like the Greylag, Bean, White-front, Pinkfoot, Snow, Bar-headed, Canada, Brent, Barnacle, etc., were included the Andean, Upland, Kelp, etc. (genus *Chloëphaga*), the Abyssinian Blue-winged Goose (*Cyanochen*), the Australian Cape Barren Goose (*Cereopsis*), the Spur-winged Goose (*Plectropterus*), the Maned Goose (*Chenonetta*), and even the tiny Pygmy Geese of the genus *Nettapus*. All were considered as one subfamily. Subsequent close investigations, in which the consideration of innate behavior patterns played an important part, revealed the indubitable fact that these birds, so far from being closely related to each other, really belong to at least three different groups, the true Geese, the Sheldrakes, and the Perching Ducks. The genus *Chloëphaga*, the Abyssinian Blue-winged, and the Cape Barren Goose, have, all of them, evolved from the Sheldrake group, but, in all probability, independently from each other and in very different parts of the world. The Spur-winged

Goose belongs to one group of the Perching Ducks and is allied to the Muscovy Duck, while the Maned Goose and the Pygmy Geese belong to another, and are closely related to the Mandarin and Carolina [=Wood] Ducks. All instinctive behavior patterns of these birds, particularly those of courtship display, are quite typical of the respective groups to which they belong. None of these innate movements is common to all so-called 'Geese.' The fact that the latter do not, by any means, represent a phyletically coherent subfamily is further emphasized by a great number of other morphological characters.

It is, on principle, impossible to attribute a fixed and constant systematic value to any single character, because one and the same structure may, in different groups, undergo evolutionary change at quite different speeds. What is an exceeding conservative, slow-changing property in one family or order, may be very plastic in another. In the Anatidae, for example, the color markings of the downy young are evidently most resistant to evolutionary change, while the form of head and bill is extremely plastic; in the family of Rails (Rallidae) the very opposite is true. The 'relative conservativity' of every single property must, therefore, be gauged in every single instance by a thorough comparison with as many other characters as possible. If, in a group of animals represented by a considerable number of forms, we amass as many comparable characters as possible, our conclusions become more reliable in geometrical proportion to the number of characters considered. The historical correctness of our conclusions increases not only with the number of agreeing 'documents' which point in one direction, but the significance of each document is increased with the number of others with which we are able to compare it, in order to ascertain its particular age and value.

This is precisely why the phylogeneticist is forever on the lookout for new, comparable characters; and also why he prefers to work on groups which are rich in species. A group consisting exclusively of one or two isolated species with nothing but 'missing links' to join it together, and on to other groups, is obviously not a favorable object for evolutionary studies. On the other hand, in a group with many species, every taxonomic character can be studied in many different forms and stages of differentiation. Charles Otis Whitman and Oskar Heinroth, the pioneers of Comparative Ethology, both chose for investigation a group which fulfilled these requirements: the former worked on the pigeons, the latter on the ducks and geese. It is an interesting historical fact that both these scientists were primarily phyleticists rather than behavior students and that it was their assiduous search for comparable characters that induced them to bring innate behavior patterns into consideration. Thus, Comparative Ethology originated in the service of the study of evolution.

Thus we may infer that the studies of evolution in general and of comparative ethology in particular are dependent on a suitable object of study which possesses certain essential qualities. The discovery of a law of nature has always been dependent upon the selection or discovery of a favorable object of study. If we review these essential qualities we find ourselves simultaneously expounding the scientific value of collecting and keeping live animals belonging to one systematic group. For the purpose of the studies in question it is necessary to keep live animals in perfect condition, in order to investigate their innate behavior patterns. It would be absolutely impossible to acquire an extensive comparative knowledge of these patterns by field observation alone, even if one genus were not, as it so often is, distributed all over the globe. The group chosen for an object of a study ought, therefore, to be technically easy to keep and to breed; only if the animals display the whole inventory of their instinctive activities are we furnished with a solid basis for our comparison of behavior. The group must also be rich in innate behavior patterns and,

last but not least, it must contain an abundance of sub-orders, families, genera, and species, and there must be enough gradations and transitions which link up the under-groups.

There can be hardly any doubt that, among all the groups of animals which are available in captivity at present, the family Anatidae is the one which fulfills all these requirements in the most ideal manner. Though C. O. Whitman worked on pigeons and though valuable work has been done on Cichlid fishes, the Anatidae still rank first as an object of evolutionary and ethological study. A number of prominent phylogeneticists such as Heinroth, Mayr, Delacour, von Boetticher, and others have given special attention to this family. The writer of these lines, as a comparative ethologist, has found the unique collection of Anatidae at the New Grounds a wonderful subject for his investigations. The word 'unique' is not used here in the complimentary but in the literal sense. There is not, in all the world, another collection of Anatidae as complete, and what is more, there is no other collection of any group of live animals which could, for the type of evolutionary investigations sketched in this article, be exploited to such advantage as that of the Severn Wildfowl Trust.

Systematics and taxonomy are regarded by many people as tedious subjects. Some biologists even think that phylogenetic investigations performed by the method of systematic comparison are something rather antiquated, something that was all right in the days of Darwin and Wallace, but rather out of date at the present time. So far from having shot its bolt, however, phylogenetics is only beginning to get, from other branches of biological science, the consideration which it merits. The current modern physiology of the central nervous system, to cite only one instance, would do well to give more thought to phylogenetic considerations. The 'simple' reflex-arc, still regarded by many physiologists as *the* basic element of all central nervous structures and functions, is, in reality, a phyletically extremely 'young' acquisition which does not occur at a lower stage of evolution than birds and mammals. But apart from their everlasting scientific value, phylogenetic studies done by the good old method of comparison of homologous characters are a superlatively alluring occupation. The attempt to disentangle the course which evolution has taken ages ago, by the simple means of comparing the similarities and dissimilarities of living animals, and thus delving into times a thousandfold more remote than the earliest dawn of human history, is among the most fascinating enterprises that the human mind can undertake. To me, at least, it always causes a truly reverential thrill, whenever comparative study leads to some real insight into the blood-relationship of different species and allows us, to a certain extent, to reconstruct their latest common ancestor!

This number of *The Wilson Bulletin* was published on April 22, 1953.

EDITOR OF THE WILSON BULLETIN

HARRISON B. TORDOFF
Museum of Natural History
University of Kansas
Lawrence, Kansas

ASSOCIATE EDITORS

KEITH R. KELSON

ROBERT M. MENGEL

SUGGESTIONS TO AUTHORS

Manuscripts intended for publication in *The Wilson Bulletin* should be neatly typewritten, double-spaced, and on one side only of good quality white paper. Tables should be typed on separate sheets. Before preparing these, carefully consider whether the material is best presented in tabular form. Where the value of quantitative data can be enhanced by use of appropriate statistical methods, these should be used. Follow the A. O. U. Check-List (fourth edition) and supplements thereto insofar as scientific names of United States and Canadian birds are concerned unless a satisfactory explanation is offered for doing otherwise. Use species names (binomials) unless specimens have actually been handled and subspecifically identified. Summaries of major papers should be brief but quotable. Where fewer than five papers are cited, the citations may be included in the text. All citations in "General Notes" should be included in the text. Follow carefully the style used in this issue in listing the literature cited. Photographs for illustrations should be sharp, have good contrast, and be on glossy paper. Submit prints unmounted and attach to each a brief but adequate legend. Do not write heavily on the backs of photographs. Diagrams and line drawings should be in black ink and their lettering large enough to permit reduction. The Illustrations Committee will prepare drawings, following authors' directions, at a charge of $1 an hour, the money to go into the color-plate fund. Authors are requested to return proof promptly. Extensive alterations in copy after the type has been set must be charged to the author.

A WORD TO MEMBERS

The Wilson Bulletin is not as large as we want it to be. It will become larger as funds for publication increase. The Club loses money, and the size of the *Bulletin* is cut down accordingly, each time a member fails to pay dues and is put on the 'suspended list.' Postage is used in notifying the publisher of this suspension. More postage is used in notifying the member and urging him to pay his dues. When he does finally pay he must be reinstated on the mailing list and there is a publisher's charge for this service. The *Bulletin* will become larger if members will make a point of paying their dues promptly.

NOTICE OF CHANGE OF ADDRESS

If your address changes, notify the Club immediately. Send your complete new address to the Treasurer, Leonard C. Brecher, 1900 Spring Drive, Louisville 5, Kentucky. He in turn will notify the publisher and editor.

THIRTY-FOURTH ANNUAL MEETING

of the

WILSON ORNITHOLOGICAL CLUB

UNIVERSITY OF MICHIGAN BIOLOGICAL STATION
DOUGLAS LAKE, CHEBOYGAN, MICHIGAN

SUNDAY, JUNE 14, TO WEDNESDAY, JUNE 17

Members have now received a letter announcing complete details and requesting papers. This meeting affords us an opportunity to see a most interesting area and enjoy its northern flora and fauna. The University of Michigan's generosity in placing at our disposal the station's sleeping quarters, dining room, and commissary makes it imperative that members register in advance, and you are urged to do so as soon as possible.